pp. 501-592] June, 1955

TROPICAL DISEASES BULLETIN

Vol. 52] 1955 [No. 6

MAIN CONTENTS

	PAGES
Summary of Recent Abstracts. V. Leishmaniasis	501
Malaria	505
Trypanosomiasis	518
Leishmaniasis	520
Fevers of the Typhus Group ...	524
Yellow Fever	528
Dengue and Allied Fevers ...	531
Rabies	531
Plague	534
Cholera	535
Amoebiasis and Intestinal Protozoal Infections	535
Relapsing Fever and other Spirochaetoses	542
Leprosy	543
Helminthiasis	549
Deficiency Diseases	566
Sprue	569
Haematology	570
Venoms and Antivenenes	574
Toxoplasmosis	575
Dermatology and Fungus Diseases	577
Tropical Ophthalmology	579
Tropical Ulcer	582
Miscellaneous Diseases	582
Parasitology: General	583
Entomology and Insecticides: General Zoology	584
Miscellaneous Papers	591
Reports and Surveys	592

For detailed Contents see pp. ii onwards.

Issued under the Direction of
the Honorary Managing Committee of the

BUREAU OF HYGIENE AND TROPICAL DISEASES

Keppel Street, London, W.C.1

Telephone: Museum 3041

Price 7/6 net] *Entered as Second Class Matter in the U.S.A. Post.* Annual Subscription (January-December) 70s. $10

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES

Chairman: Sir Eric Pridie, *K.C.M.G.*, *D.S.O.*, *O.B.E.*, M.B., B.S., F.R.C.P.
(*Chief Medical Officer, Colonial Office*)

Professor Patrick A. Buxton, *C.M.G.*, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S.
(*representing the Royal Society*)

Sir John Charles, M.D., F.R.C.P., D.P.H. (*representing the Ministry of Health*)

Lieut.-General Sir James Bennett Hance, *K.C.M.G.*, *K.C.I.E.*, *O.B.E.*, M.D., F.R.C.S.Ed., I.M.S. (retd.)

Sir Harold P. Himsworth, *K.C.B.*, M.D., F.R.C.P., F.R.S.
(*representing the Medical Research Council*)

Sir Wilson Jameson, *G.B.E.*, *K.C.B.*, M.D., F.R.C.P.

Professor G. Macdonald, *C.M.G.*, M.D., M.R.C.P., D.P.H., D.T.M.

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

E. R. A. Merewether, *C.B.E.*, M.D., F.R.C.P., F.R.S.E.

J. B. Sidebotham, *C.M.G.*, M.A.

Andrew Topping, *C.M.G.*, *T.D.*, M.A., M.D., F.R.C.P., D.P.H.

N. D. Watson (*of the Colonial Office*)

Secretary: G. J. Lunnon, *M.B.E.* (*of the Colonial Office*)

STAFF OF THE BUREAU

Charles Wilcocks, *C.M.G.*, M.D., F.R.C.P., D.T.M. & H., *Director*

H. J. O'D. Burke-Gaffney, *O.B.E.*, B.A., M.D., *Assistant Director*

John Rathborn, B.A., *Secretary*

Joan E. D'Arcy Hart (*Asst. Sec.*)
Peggy Carolan
Alice D. Crump
Phyllis V. Hunt, M.A., B.Litt.
F. W. Norfolk
J. W. Priestley
Sylvia Russo
Delphine A. Sowman

LIST OF ABSTRACTERS IN THIS ISSUE:

A. R. D. Adams, M.D., F.R.C.P., D.T.M.
D. J. Bauer, M.B., B.Chir., Ph.D.
R. S. Bray, B.Sc., Ph.D.
Professor J. J. C. Buckley, D.Sc.
H. J. O'D. Burke-Gaffney, *O.B.E.*, B.A., M.D.
J. R. Busvine, Ph.D., D.Sc.
Professor P. A. Buxton, *C.M.G.*, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S.
I. A. B. Cathie, M.D., M.R.C.S., M.R.C.P.
Maj.-Gen. Sir G. Covell, *C.I.E.*, M.D., D.P.H., D.T.M. & H., I.M.S. (retd.)
J. T. Duncan, F.R.C.S., L.R.C.P. (Ire.), D.T.M. & H.
J. D. Fulton, M.A., B.Sc., Ph.D., M.B., Ch.B., D.T.M.
Professor P. C. C. Garnham, M.D., D.Sc., M.R.C.S., L.R.C.P., D.P.H.
Professor L. P. Garrod, M.D., F.R.C.P.
M. Gelfand, *O.B.E.*, M.D., F.R.C.P.
Professor R. M. Gordon, *O.B.E.*, M.D., Sc.D., F.R.C.P., D.P.H.
Edward Hindle, M.A., Sc.D., Ph.D., F.R.S.
C. A. Hoare, D.Sc., F.R.S.
Miss Anne Hudson, B.Sc.
Lieut.-Col. E. W. O'G. Kirwan, *C.I.E.*, M.Sc., M.D., F.R.C.S.I., I.M.S. (retd.)
G. Lapage, M.D., M.Sc.
H. S. Leeson, F.R.E.S.
H. Lehmann, Ph.D., M.D., F.R.I.C.
Professor G. Macdonald, *C.M.G.*, M.D., F.R.C.P., D.P.H., D.T.M.
Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.
Maj.-Gen. Sir John W. D. Megaw, *K.C.I.E.*, D.Sc., M.B., B.Ch., I.M.S. (retd.)
Ernest Muir, *C.M.G.*, *C.I.E.*, M.D., F.R.C.S. Ed.
L. E. Napier, *C.I.E.*, F.R.C.P.
Lieut.-Col. R. Passmore, M.A., D.M., I.M.S. (retd.)
Professor Dean A. Smith, *O.B.E.*, M.D., D.T.M. & H.
G. Stuart, *O.B.E.*, M.D., D.P.H.
M. G. R. Varma, B.Sc.
Charles Wilcocks, *C.M.G.*, M.D., F.R.C.P., D.T.M. & H.
F. J. Wright, M.A., M.D., F.R.C.P., D.T.M. & H.

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 52] 1955 [No. 6

SUMMARY OF RECENT ABSTRACTS *

V. LEISHMANIASIS †

Visceral Leishmaniasis

Epidemiology: Transmission: Aetiology

An important account of the epidemiology of leishmaniasis in Middle Asia has been published in Russia by Latyshev *et al.* (p. 37), who note that in the mountainous area of Tadjikistan visceral leishmaniasis is prevalent, and that it has recently been found in persons settling on newly developed land to the south. The disease has been discovered in jackals there, and these seem to be the reservoirs of human infection. As villages are created the jackals are driven into the open country, and outbreaks may come to an end; but the assumption that jackals are the reservoirs would fit in with the widespread but low incidence in man. The disease, therefore, is regarded as a true zoonosis. In the large towns dogs are the reservoirs. In rural areas adult persons are often attacked, which may reflect a clinical variant of the disease, or, as Hoare remarks in comment, may reflect susceptibility in newcomers to the area.

The first known autochthonous case of visceral leishmaniasis in Saudi Arabia is reported by Tarizzo *et al.* (p. 40), and Winckel and Aalstein (p. 1152) describe the first case known to have been contracted in Surinam.

A serious outbreak of kala azar occurred in the Kitui District of Kenya, starting in 1951. Carswell (p. 159) recounts the history of this outbreak up to 1953, when it was still continuing. Apathy, emaciation, cough and glandular enlargement were common, and gross splenic enlargement and anaemia were regular features. For treatment pentamidine isethionate and urea stibamine were used chiefly, and Pentostam was tried. Heisch (p. 159) reports a visit to the Kitui District, during which various species of *Phlebotomus* were collected, but the actual vector was not at that time determined. [Further work on this outbreak is reported below, p. 520.]

A paper on the Phlebotominae of the Sudan has been published by Lewis

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1954, v. 51. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leishmaniasis in this series see the June issues of the *Tropical Diseases Bulletin* each year since 1939.

and KIRK (p. 1115), who note that oriental sore occurs in riverine areas where *P. papatasi* may be considered the vector, and also in Darfur and the Nuba mountains, the Blue Nile and other areas where kala azar is endemic. *P. orientalis* corresponds in distribution with the kala azar area; *P. clydei* may be a (poor) vector.

A study of sandflies in Serbia shows that *Phlebotomus papatasi* and *P. perfiliewi* partake mainly of human blood and that the other species prefer animals. KOSTIĆ (p. 899) describes the technique used in this investigation of the vectors of kala azar.

MITRA (p. 553) describes the distribution of *Phlebotomus* in Bombay State.

By means of the newer histochemical techniques SEN GUPTA and BHATTACHARJEE (p. 40) have investigated the cytology of *Leishmania donovani*. Details should be sought in the original. A study of the metabolism of *L. donovani* in culture has been reported by CROWTHER *et al.* (p. 783), who show that the main products of metabolism were carbon dioxide, acetic, pyruvic and succinic acids. The chief source of carbohydrate for the organisms was glucose, and oxygen consumption and other metabolic activities depended on its presence in the medium.

Tests: Clinical Findings

A complement-fixation test in which the antigen is prepared from the spleen of a heavily infected hamster is described by WENG *et al.* (p. 553) in China. The antigen can be dried and kept. Results in a large number of sera from patients with kala azar showed that the test gave a correct diagnosis in 97·5 per cent. if doubtful and anticomplementary cases were excluded (they were relatively few), but the authors remark that final diagnosis should be decided by the finding of *L. donovani*.

Electrophoretic studies have been made by several authors on the serum in kala azar. SEN GUPTA *et al.* (p. 160) recognized a slow-moving gamma globulin which appears to be characteristic of the disease, and VARGUES and RAFFI (p. 474) also report on this, which they found by the method of Sandor. The patterns of the curve of optical density produced by this method, in which various strengths of hydrochloric acid are added to the diluted serum, is useful in diagnosis, prognosis and control of treatment. The electrophoretic analysis of serum proteins in hamsters and chinchillas infected with *L. donovani* is described by STAUBER *et al.* (p. 1232). In hamsters gamma globulin was at a low level, but the alpha-2 fraction was increased; in chinchillas there was hypergammaglobulinaemia.

CHATTERJEE and HAGEN (p. 475) describe the clinical features of kala azar as they have seen it in a large number of patients in a hospital near the border of West Bengal, noting that the highest incidence was at age 20–25. In treatment they used urea stibamine, with apparently good results.

Patients with kala azar in India are often emaciated and show signs of avitaminosis. SEN GUPTA *et al.* (p. 41) found evidence of deficiency of vitamins of the groups A, B and C, but not of D, in a series of patients, and they suggest that for A and (to some extent) B and C, liver dysfunction is responsible, but that impairment of adrenocortical function, known to occur in kala azar, is also a factor for C. In comment Napier suggests that deliberate underfeeding during fever may be a cause, and advocates further research.

A case of leishmaniasis with severe and disfiguring mucocutaneous manifestations is described from China by CHU (p. 555).

DEY and KUAR (p. 161) describe a few cases of post-kala-azar dermal

leishmaniasis from Assam, where it is rare. They regard the condition as an example of partial host-parasite adjustment. A course of 50 injections of antimony is usually needed for treatment, but nicotinic acid sometimes may be useful in reducing the course. Post-kala-azar dermal leishmaniasis is extremely rare in China. Chen *et al.* (p. 681) report two cases in which intensive treatment with antimony was effective, but in comment Napier suggests that there is no evidence that the intensive treatment is any more successful than more extended courses, either to prevent or to cure the condition.

Treatment: Control

Three preparations of sodium antimony gluconate were tested in a large series of cases of kala azar in China by Ho *et al.* (p. 42), with results which were significantly better than those obtained with urea stibamine. The drugs were given intravenously twice each week and the course of the infection was measured by sternal puncture. The individual doses were 25–33·3 mgm. Sb per kgm.; some patients appear to have received 11 injections. Faiolo and Caporaletti (p. 554) write favourably of Glucantime in 4 cases of kala azar.

In East Bengal a unit working under WHO made a survey of 6,108 children, of whom 8·35 per cent. were diagnosed as having kala azar. All buildings in the area were then subjected to a DDT spray campaign, and Gramiccia and Sacca (p. 554) show that a subsequent survey suggested that transmission had been materially reduced.

Cutaneous Leishmaniasis

In the Province of Teramo, Italy, a survey of leishmaniasis by Cicchini and Corporandi (p. 556) showed that the cutaneous form is prevalent, especially along the river valleys. *P. perfiliewi*, *P. perniciosus* and *P. papatasi* are found, and both visceral and cutaneous forms of the infection have been observed in dogs.

In Middle Asia Latyshev *et al.* (p. 37) recognize the moist (rural or desert) form of cutaneous leishmaniasis, which is a zoonosis and of which gerbils are the reservoir, and the dry (urban) form. The vectors of the moist form are *P. caucasicus*, *P. papatasi* and *P. arpaklensis*; of the dry form *P. papatasi*, *P. sergenti*, *P. caucasicus* and *P. chinensis*. Gerbils were found near one town, but they were free from infection and no sandflies were found in their burrows; the source of that infection remains doubtful. Kryukova (p. 37) discusses the findings on which *P. arpaklensis* is suspected of being a vector; it belongs to the *minutus* group, which has not previously been incriminated in transmission of leishmaniasis. The moist form of cutaneous leishmaniasis occurs in north-eastern Persia, and Ansari and Faghih (p. 557) found the disease in (and isolated *L. tropica* from) the gerbil *Rhombomys opimus*; several other rodents were negative. One strain of *L. tropica* produced the disease after injection into a human subject.

From India Singh and Sur (p. 1048) describe a non-ulcerating type of cutaneous leishmaniasis which resembled the dry type of the Russian workers.

Dey and Káur (p. 783) report a case of oriental sore from Assam, where the condition has not hitherto been found. In comment Napier suggests that, in spite of the history that the young patient had not been out of the country for 8 years, the disease may have been acquired elsewhere. The patient was born in a country where oriental sore is endemic.

During 43 passages made every 14 days Morzycki (p. 784) adapted a

strain of *L. tropica* to a simple culture medium of meat and yeast broth.

Some authors have held the view that the tendency of *L. tropica* to form surface films when grown in fluid media could be used to differentiate it from *L. donovani*, but Colas-Belcour and Vervant (p. 556), testing stains from different areas, concluded that this tendency varied so much that it could not be held to constitute a specific character of *L. tropica*.

Zuckerman (p. 476) describes the initial reaction to the subcutaneous injection of cultures of *L. tropica* in the hamster. Phagocytosis takes place in the early stage but the organisms establish themselves in the lymphoid cells, especially the macrophages.

American Leishmaniasis

A thesis on cutaneous leishmaniasis, and other diseases, in the district of Escarcega, Mexico, has been published by Biagi (p. 558). In this district the chief occupation is the collection of chicle gum, the basis of chewing-gum, and a considerable incidence of the disease is recorded each year, and is related to this occupation. The commonest site is the ear. Treatment with tartar emetic gives good results. Prophylaxis is hardly practicable. In another paper the same author (p. 43) gives an account of 70 cases of chicle ulcer in Mexico, and shows that most of the patients were men. Leishmaniae are few in the lesions but the Montenegro reaction is always positive. He (p. 161) proposes the name *Leishmania tropica mexicana* for the organism, which especially attacks the ear, avoids the mucous membranes, does not produce metastases, and tends to spontaneous cure. It is apparently confined to south-east Mexico, Guatemala and British Honduras (Belize).

Calero and Johnson (p. 255) describe cases of cutaneous leishmaniasis in Panama, where the transmission season is from January to August, and where the disease is more common than has hitherto been supposed.

A description of *pian-bois* in French Guiana is given by Floch and Sureau (p. 477), who state that leishmaniae are easy to find in the early lesions, especially in the clear serum obtained by puncturing the edge of the ulcer. Infection gives rise to immunity, though this develops slowly. Anthiomaline and Glucantime are used in treatment, and Casile and Saccharin (p. 478) state that the former is the more effective. They report one case in which streptomycin with a sulphonamide had a striking effect.

Rodríguez and Avilés Nugué (p. 1232) give an account of muco-cutaneous leishmaniasis in Ecuador, with notes on the local sandflies.

Vargas and Díaz Nájera (p. 477) describe the *Phlebotomus* species common to Mexico and the United States.

Forattini *et al.* (p. 1233) have experimented with dogs in Brazil, finding them relatively unreceptive to injection of *L. brasiliensis*. Dogs are therefore not regarded as epidemiologically important.

Discussing the localization of American cutaneous leishmaniasis, de Almeida (p. 560) makes the point that the primary lesion, being due to the bite of *Phlebotomus*, is on some exposed part of the body, but that secondary lesions are widespread—nose, pharynx, legs, face, mouth, larynx and arms. His theory is that the sites of the secondary lesions are those of lower temperatures, and that this fact may explain their distribution. The spread of parasites from the site of inoculation to other parts is still a matter of controversy, however, and Paraense (p. 560) has therefore studied the course of infection with *L. enriettii* in guineapigs. He concludes that parasites are carried by the lymph stream to the lymph nodes and that metastasis occurs by the blood stream.

In a description of a case of mucocutaneous leishmaniasis Muniz (p. 900) makes the point that the old idea that *L. tropica* could be distinguished from *L. brasiliensis* by the fact that the latter does not cause systemic reaction in hamsters can no longer be held, and quotes a case to prove it.

Echandi (p. 784) used *L. brasiliensis* and *L. enriettii* as antigens for the Montenegro skin reaction in cutaneous leishmaniasis in Costa Rica, with similar results on the whole, though *L. brasiliensis* apparently gave rather stronger reactions. The skin test becomes positive early in the disease, and appears to persist for life. The universal Kahn reaction is of no value in mucocutaneous leishmaniasis, which is therefore unlikely to be the cause of false positive results in the diagnosis of syphilis and yaws (Floch and Sureau, p. 899).

In a trial of several drugs for chicle ulcer, Biagi (p. 162) found Glucantime (N-methylglucamine antimoniate) the drug of choice; tartar emetic and lomidine were useful but produced occasional toxic effects; DDS was useless. For a case of mucocutaneous leishmaniasis Pfeifer (p. 901) used Fuadin and Neosalvarsan, with berberine swabs for the nasal mucosa and local infiltration with a mepacrine-hyaluronidase solution.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

van Poll, F. M. Een geval van autochthone malaria in Noord-Brabant. [**Benign Tertian Malaria in the Province of North Brabant**] *Nederl. Tijdschr. v. Geneesk.* 1955, Jan. 1, v. 99 (i), No. 1, 28.

Black, R. H. **A Malaria Survey of the People living on the Minj River in the Western Highlands of New Guinea.** *Med. J. Australia.* 1954, Nov. 13, v. 2, No. 20, 782–7, 8 figs.

An exploratory survey was made of malaria in the Minj Valley and part of the Waghi Valley in New Guinea. Intrusion into this area is new and previous knowledge of epidemiology is sparse. In the broad, shallow Waghi valley malaria was intense and possibly hyperendemic, *Plasmodium falciparum*, *P. vivax* and *P. malariae* were present and *Anopheles farauti*, *A. punctulatus*, *A. annulipes* and *A. bancrofti* were recovered though none was found infected. In the narrower and steeper Minj valley only *A. annulipes* was recovered and only 16 of 428 blood films found positive. It is thought that transmission does not occur here, the cases being imported, and mythology indicates that the people concerned left the lower Waghi Valley owing to its malarial nature. Penetration by *A. farauti* has not been limited by altitude and might occur as suitable routes and breeding places exist.

[The paper is enlivened with an interesting account of the mythological history of the people of the valley.] *G. Macdonald*

South Pacific Commission. Noumea, New Caledonia. **Malaria in the Torres Straits Islands** [Mackerras, M. Josephine & Sandars, Dorothea F.]. *Technical Paper No. 68.* 1954, Aug., mimeographed pp. vi + 27, 3 maps & 8 figs. [18 refs.] [2s.]

This report is a part of and follows a similar pattern to the series of surveys on Melanesian islands started by Black [this *Bulletin*, 1954, v. 51, 1214]. The islands studied are in the Torres Straits between the northernmost part of Queensland and New Guinea; the area is of particular interest as it stands at the point of junction of very different intensities ranging from hyperendemic to malaria-free. The islands in the eastern and central group visited were: the Murray Islands, Darnley, Nepean, Yorke, Coconut and Yam islands. *Plasmodium falciparum* malaria was recently epidemic in the first two and the reaction of the inhabitants suggests that it was new in the first but had perhaps previously existed in the second. It was transmitted by *Anopheles farauti.* No malaria or malaria vectors were detected in the other four. No malaria was found in two of the mid-western group, Badu and Mabuiag, but 2 out of 205 people examined harboured *P. malariae* in the third, Moa, and *Anopheles bancrofti, A. meraukensis* and *A. farauti* were recovered from it. In the far-western group the incidence was low: 6 out of 77, 0 out of 10 and 1 out of 19 of the blood films examined on Boigu, Saibai and Dauan, respectively, being found positive for *P. falciparum*; however, in contrast with the other islands, *Anopheles farauti* and *A. amictus hilli* were present in very large numbers and *A. bancrofti* was also found. It is not understood why these islands are not hyperendemic unless perhaps the anophelines have been recently introduced. It is noted that *P. vivax* was not seen on any of the islands. Surveys were also carried out on Thursday Island where 0 out of 90 children had negative blood, and at three points on the northernmost part of Queensland where 1 of 206 people was found to harbour small numbers of *P. vivax.* The authors consider that malaria has disappeared from the northern part of Australia and is near vanishing point in the islands of the Torres Straits.

G. Macdonald

See also p. 584, Kershaw *et al.*, **Studies on Arthropod Survival. I.—The Pattern of Mosquito Survival in Laboratory Conditions.**

Krishnan, K. S. **Malaria Vectors of India. IV.** *A. stephensi* **Liston, 1901.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1954, May, v. 2, No. 3, 98–109, 1 map. [Numerous refs.]

A valuable summary of the biology of this insect, and a note on its interest in the laboratory.

Jones, J. C. **The Heart and Associated Tissues of** *Anopheles quadrimaculatus* **Say (Diptera: Culicidae).** Reprinted from *J. Morphology.* 1954, Jan., v. 94, No. 1, 71–123, 17 figs. on 4 pls. [Numerous refs.]

Nederlandsch Tijdschr. v. Geneesk. 1955, Jan. 1, v. 99 (i), No. 1, 21–7, 2 figs. Een patiënte met maagpoliep, transfusie-malaria en peritonitis. (2e clinisch-pathologische conferentie; 14 januari 1954 [Meyers, F. M., Chairman].) [**Polypus of the Stomach, Transfusion Malaria and Peritonitis in a Female Patient**]

The English summary appended to the paper is as follows:—

"A Conference of Clinical Pathology saw a female patient whose case

had been diagnosed as carcinoma ventriculi, but operation revealed a large polypus in the stomach. Postoperative malaria developed due to a mixed infection by Plasmodium vivax and Plasmodium malariae, caused almost certainly by transfusion of blood which had been donated by a Korean war veteran. Finally the patient developed peritonitis, originating from an infection in the bed of the wound. Discussion of the antibiotic therapy which was given, and its risks.''

Dutta, C. P., Pradhan, J. & Bhattacharjee, S. K. **Field Trials of Nivaquine, Camoquin and Resochin against Human Malaria.** *Indian J. Malariology.* 1954, Sept., v. 8, No. 3, 219–27.

These trials were conducted in the Province of Assam in eastern India. The subjects treated were: (a) patients attending various dispensaries in the districts of Sibsagar and Goalpara, the drug being administered by dispensary medical officers, and (b) patients treated at the Malaria Institute, Shillong, under the direct supervision of the authors. The former group received either Nivaquine (chloroquine sulphate) or Camoquin (amodiaquine dihydrochloride); the latter Resochin (chloroquine diphosphate).

Nivaquine, in tablets containing 200 mgm. [presumably of the salt, *i.e.*, 150 mgm. chloroquine base] was administered to 96 patients (24 *P. falciparum*, 54 *P. vivax*, 18 mixed *P. falciparum* and *P. vivax*). The scale of dosage for adults was: first day 6 tablets in 3 divided doses; second day 2 tablets, single dose; third day 2 tablets, single dose. This was followed by 2 tablets once weekly for 5 weeks.

Camoquin, in tablets containing 200 mgm. [presumably amodiaquine base] was given to 31 patients (7 *P. falciparum*, 20 *P. vivax*, 4 mixed *P. falciparum* and *P. vivax*). All the *P. falciparum* patients, 13 of the *P. vivax* and 2 with mixed *P. falciparum* and *P. vivax* infections received a single-dose treatment of 3 tablets. The remainder were given the same amount, but in divided doses.

Resochin, in tablets containing 150 mgm. chloroquine base, was given to 100 patients divided into 2 groups. Group I (60 patients; 30 *P. falciparum*, 15 *P. vivax*, 15 mixed *P. falciparum* and *P. vivax*) received: first day 6 tablets in 3 divided doses; second day 2 tablets, single dose; third day 2 tablets, single dose. This was followed by 2 tablets once weekly for 5 weeks. Group II (40 patients: 20 *P. falciparum*, 10 *P. vivax*, 10 mixed *P. falciparum* and *P. vivax*) received a single dose of 3 to 4 tablets followed by one tablet weekly for 5 weeks.

All three drugs effected rapid clearance of parasitaemia, 48·4 per cent. within 24 hours, 79 per cent. within 48 hours and 90 per cent. within 72 hours. The best results were obtained with Resochin, and the next best with Camoquin. Single-dose treatment with Resochin was particularly successful, clinical symptoms disappearing in all cases within 48 hours.

G. Covell

Gunther, C. E. M. **A Fatal Overdose of "Daraprim".** *Med. J. Australia.* 1954, Dec. 18, v. 2, No. 25, 970.

The author, from New Guinea, refers to 3 previous cases in which children had swallowed about 15 tablets (375 mgm.) of pyrimethamine: one died of convulsions in 2 hours and the other two did not suffer severe effects [the record of these cases, and a subsequent quotation, are incorrectly attributed by the author to Covell: in fact they refer to a paper by Taylor, this

Bulletin, 1953, v. 50, 1006. The reference to Covell *et al.* given by the author is itself incorrectly cited and the wrong page number is given.]

The author then quotes the case of a white girl of 2½ years old at Mumeng in New Guinea, who secured a bottle of "Daraprim" [pyrimethamine] and consumed 16 tablets [400 mgm.]. After vomiting and convulsions, she became comatose, collapsed and cyanosed and died, despite appropriate treatment, within 2½ hours.

The child had been given "Daraprim" regularly for malaria prophylaxis and the author states, very properly, that in malarious areas children should be made familiar with the drug and taught to take it willingly. But he does not consider that locking it up, as stressed by Taylor, is the real solution; he also quotes evidence of a child eating the far less palatable proguanil [this *Bulletin*, 1951, v. 48, 523]. "In most tropical households the drug in use is as familiar on the table as the cruet." The author considers that "it is almost impossible to keep anti-malarial drugs always out of reach of an enterprising child", and that the better safety measure ("while, of course, an attempt is made to keep all drugs away from children") is to choose the less toxic and less dangerous drug for household use. [The abstracter finds it hard to believe that keeping antimalarial drugs "out of reach of an enterprising child" presents insuperable difficulties: certainly not such as to warrant allowing potentially poisonous quantities of any drug to be "left about as the cruet is" or to influence one's choice of an antimalarial.] *H. J. O'D. Burke-Gaffney*

Bray, R. S.; Rollo, I. M. **Resistance of *Plasmodium falciparum* to Pyrimethamine.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 93–5. [10 refs.]

i. Bray, writing from the Department of Parasitology of the London School of Hygiene and Tropical Medicine, comments on the paper by Clyde and Shute on resistance of East African "varieties" of *P. falciparum* to pyrimethamine [this *Bulletin*, 1955, v. 52, 248].

In his experience resistance is labile, quickly built up and quickly lost, and requiring constant treatment to maintain it at a high level in the case of *P. berghei* infections. Bray considers, therefore, that the rather elaborate theories postulated by the authors seem to be unnecessary to explain the partial disappearance of drug-resistant parasites after treatment is stopped.

He also suggests that a single dose of 100 mgm. of pyrimethamine may not entirely eradicate blood forms of *P. falciparum* and quotes comparable examples for other species.

If his suggestion is considered reasonable, Bray considers that the 20 per cent. susceptible fraction of Clyde and Shute becomes a 20 per cent. (or some part of it) insusceptible residuum of continuous schizogony which would be the foundation of drug resistance, being treated constantly by spaced dosage in the same host. He refers by way of analogy to resistance on a swift scale seen in *P. cynomolgi* infections treated by Schmidt and Genther [this *Bulletin*, 1953, v. 50, 480]. The regimen carried out by Clyde and Shute might be expected to produce resistance on the same swift scale and these considerations would alter considerably the conclusions drawn by them.

Bray appeals against the use of the word "variety" to describe drug-resistant strains of a parasite, in the absence of a simultaneous and reproducible morphological change. In general protozoologists do not practise the nomination of varieties.

ii. Rollo, from the Wellcome Laboratories of Tropical Medicine, also refers to the paper by Clyde and Shute.

He quotes several controlled trials in which infection was eliminated and re-infection prevented in large communities by weekly doses of pyrimethamine: in no case was there evidence of resistance [this *Bulletin*, 1954, v. 51, 677, 1036]. Resistance to pyrimethamine may be induced readily in, for example, *P. berghei*, in the laboratory by giving subcurative doses at suitably spaced intervals. The experiments of Clyde and Shute suggest that resistance may occur in *P. falciparum* infections when widely spaced doses of pyrimethamine are given. Rollo points out that when this drug is used for antimalarial prophylaxis, the interval between doses should not be greater than one week—an interval recommended as a result of pharmacological and clinical studies.

Experiments with *P. berghei* and *P. gallinaceum* showed that withholding of the drug resulted in a highly resistant strain regaining sensitivity, so that pyrimethamine resistance seems to be labile: this accords with the observation of Clyde and Shute that "resistant varieties regressed and became submerged".

Rollo challenges the authors' statement that pyrimethamine acts by blocking folinic acid and PAB: in fact, as far as is known, it acts by blocking the conversion of folic acid to folinic acid; and although PAB has been shown to be important in the metabolism of *P. berghei* and *P. cynomolgi* [this *Bulletin*, 1953, v. 50, 1122], there is no evidence that folinic acid is necessary for the normal metabolism of plasmodia.

Rollo also states that the authors are incorrect in claiming that folinic acids were shown to have no similar action to that of PAB in inhibiting the action of proguanil: in fact, Greenberg [*ibid.*, 1122] showed that pteroylglutamic acid (folic acid) and calcium leucovorin (folinic acid) did inhibit the action of proguanil against *P. gallinaceum*.

H. J. O'D. Burke-Gaffney

Dern, R. J., Beutler, E. & Alving, A. S. **The Hemolytic Effect of Primaquine. V. Primaquine Sensitivity as a Manifestation of a Multiple Drug Sensitivity.** *J. Lab. & Clin. Med.* 1955, Jan., v. 45. No. 1, 30–39, 6 figs. [12 refs.]

In an earlier paper [this *Bulletin*, 1954, v. 51, 676] the authors reported that about 10 per cent. of American Negroes have an intrinsic defect of the red blood cells which results in the development of an acute haemolytic anaemia when they are given 30 mgm. of primaquine base daily. It has since been found that because of this defect erythrocytes are also abnormally sensitive to haemolysis by a number of other compounds. In the paper under review data are recorded in respect of 8 aniline derivatives, all of which are established therapeutic agents.

Primaquine-sensitive cells were shown to be unusually susceptible to haemolysis by acetanilide, sulphanilamide, thiazolsulphone (Promizole), phenylhydrazine, sulphoxone (Diasone) and phenacetin. In very high doses or in combinations most of the active compounds were found to be haemolytic to normal cells.

The characteristics of the haemolytic anaemia resulting from the administration of either sulphanilamide or acetanilide to a primaquine-sensitive person were identical with those of a primaquine-induced haemolytic anaemia [*ibid.*, 1955, v. 52, 333]. Immediately after administration of these compounds, a temporary primaquine insensitivity was observed.

The probable mechanism of drug-induced haemolytic anaemia seen occasionally in normal persons is described and discussed. *G. Covell*

Beutler, E., Dern, R. J. & Alving, A. S. **The Hemolytic Effect of Primaquine. VI. An *in vitro* Test for Sensitivity of Erythrocytes to Primaquine.** *J. Lab. & Clin. Med.* 1955, Jan., v. 45, No. 1, 40–50, 2 figs. [12 refs.]

Hitherto, only two methods have been available for determining whether or not red blood cells are sensitive to primaquine. The drug could be administered and the blood and urine observed for evidence of acute haemolysis, or the survival of the cells could be measured after transfusing them into a subject who was given primaquine. Neither of these tests is suitable for clinical use or for studies of the incidence and genetics of the sensitive group.

The authors have demonstrated that erythrocytes of sensitive persons are more sensitive to the *in vitro* Heinz-body-forming action of a variety of agents than are non-sensitive cells. This has been made the basis of a simple *in vitro* test which predicts primaquine sensitivity. The test is based on the difference in Heinz-body formation by acetylphenylhydrazine. Tests of the blood of 104 volunteers indicated a degree of accuracy exceeding 98 per cent.

Heinz-body formation by phenylhydrazine, primaquine, hydroxylamine and ascorbic acid in sensitive and non-sensitive cells was compared. It is thought that the mechanism of Heinz-body formation by this group of substances may be oxidation of a red-cell component, and that sensitive cells may be deficient in a protective enzyme system. *G. Covell*

Bull. World Health Organization. Geneva. 1954, v. 11, Nos. 4/5, 509–889, numerous figs. [Numerous refs.] **Malaria Control.**

The editors bring together in one number 16 papers on the control of malaria. A brief but valuable paper by E. J. Pampana (*Changing Strategy in Malaria Control*, pp. 513–520) reviews the development of strategy and particularly the growth of the concept of total elimination of malaria crystallized by the Expert Committee on Malaria [this *Bulletin*, 1954, v. 51, 1028]. He gives two serious warnings: elimination is not to be considered an easy thing, and full compliance with the requirements of the Expert Committee is essential. Increasing evidence of the possibility of anophelines developing resistance to insecticides makes it more urgent to attain the goal rapidly and over extensive areas demarcated to limit re-infection rather than to comply with political boundaries.

P. H. van Thiel and D. Metselaar (*A Pilot Project of Residual-Insecticide Spraying to Control Malaria transmitted by the Anopheles punctulatus Group in Netherlands New Guinea*, pp. 521–24) fill a gap in knowledge by some field studies on the *Anopheles punctulatus* group in New Guinea demonstrating, contrary to previous belief, that the majority of those biting man rest the night in human habitations, and that in test huts simulating natural conditions they are in fact effectively killed by DDT at 2 gm. per square metre or dieldrin at 500 mgm. per square metre.

Four papers set in a similar pattern give a comprehensive account of the

ecology, entomology, epidemiology and control of malaria in four French territories. J. Hamon and G. Dufour (*La Lutte Antipaludique à la Réunion*, pp. 525–56) describe Réunion, throughout which island malaria has been reduced to a very low level by a programme combining residual insecticides, anti-larval work and drug prophylaxis. Transmission is ended but the breeding of *Anopheles gambiae* continues, though it seems that local eradication can be secured by antilarval means. The growth of resistance to DDT by *Culex fatigans*, locally responsible for the transmission of filariasis, is well documented, the authors considering that water management is the sole method of control. J. Sautet and R. Aldighieri (*La Lutte Antipaludique à la Guadeloupe*, pp. 557–77) discuss Guadeloupe, where the disease was transmitted by *Anopheles albimanus*, *A. argyritarsis* and *A. aquasalis*, in a similarly comprehensive manner. H. Floch (*La Lutte Antipaludique en Guyane Française*, pp. 579–633) describes control in French Guiana in an account notable for its detailed entomological statement. The effort was made to control malaria transmission by *Anopheles darlingi* and *A. aquasalis* and to eliminate *Aëdes aegypti*. Eradication of *A. darlingi* is almost complete, there having been only one capture in 1953, but there is less effect on the breeding of *A. aquasalis*. The *Aëdes aegypti* index has sunk to zero but the caution is sounded that a yellow-fever reservoir continues in the monkeys. C. M. J. Jaujou (*La Lutte Antipaludique en Corse*, pp. 635–77) describes conditions in Corsica where the primary results of residual insecticides almost produced elimination of malaria, though some migration of *A. labranchiae* to the hills has been caused [see also Sautet, this *Bulletin*, 1955, v. 52, 436].

The paper by L. Mara (*Malaria Control in South Malabar, Madras State*, pp. 679–723) concerns a general programme by WHO, UNICEF, the Government of India and the Government of Madras in a technically very difficult montane and sub-montane area infested by *A. fluviatilis*. The cooperation of additional staff such as health nurses is briefly described. The work includes a thorough epidemiological survey and a demonstration that a single application of 2 gm. per square metre of DDT appeared to end transmission, whereas one of 0·5 gm. per square metre gave a moderate but not fully satisfactory degree of control. F. J. Dy (*Present Status of Malaria Control in Asia*, pp. 725–63) reviews some of the data submitted to the recent conference in Bangkok [*ibid.*, 1955, v. 52, 3]. The replies to questionaries are here tabulated to give information concerning the countries of South-East Asia on such matters as the scale of control, the vectors and transmission season, the techniques used, training and organization and distribution of costs. It is notable that in these countries 46 million of the 271 million exposed to risk are now protected and that there are active plans to treble the present work.

M. A. Farid (*Ineffectiveness of DDT Residual Spraying in Stopping Malaria Transmission in the Jordan Valley*, pp. 765–83) describes malaria control activities in the Jordan Valley by insecticides. Transmission by *A. sacharovi* is ended but serious transmission and indeed epidemics continue in some places and are attributable to *A. superpictus* and *A. sergenti*. He considers that failure is attributable to an exophilic habit of the mosquito; it is common where numerous outdoor shelters, such as cracks and caves, exist and he concludes that larval control remains necessary. [Though this may be the case the data produced in the paper do not adequately establish it, though it is fair to say that work was carried out under distracting conditions of refugee movement which interfered with observation.] Residuals were widely used in April and August 1950 and in April of 1951 and 1952, larvicides also being used in the last 2 years and some caves

treated with residuals in 1952. Consecutive observations can only be traced in a few villages: in Baqura consecutive infant parasite rates were 1 in 27, 1 in 21 and 3 in 32, but the general spleen rate fell from 73 to 15 per cent.; in Mukheiba Fauqa the infant rates were 20 in 23, 4 in 14, 0 in 14 and 1 in 12 but the spleen rate only fell from 74 to 58 per cent. In some other villages for which the previous record is not traceable there was a material outbreak in November 1952—six months after the last application of 2 gm. per square metre DDT. It reached its height in El Gurm which is not, however, traceable in the detailed statement given of insecticide application in 1952.

I. H. Vincke (*Prophylaxie Médicamenteuse du Paludisme en Zone Rurale*, pp. 785–92) analyses the effect of 5, 10 and 20 weekly doses of 25 mgm. pyrimethamine on the elimination of malaria infection where transmission is not occurring, and shows virtually complete elimination without relapse within 6 months following 5 or more doses. He concludes that drug prophylaxis may be a valuable adjunct to insect control, the two making malaria elimination possible within sufficiently short time to make the possibility of insect resistance to DDT unimportant.

M.-E. Farinaud and R. Choumara (*La Prophylaxie du Paludisme dans les Pays Montagnards du Sud Viet-Nam*, pp. 793–837) produce important data concerning the control of the intense holo-endemic malaria carried by *A. minimus* in Indo-China. Malariometric data demonstrate its comparability with the highest endemicities of the world. Residual insecticides alone produce full control of transmission and satisfactory reduction of parasite rates, provided that they are continued for a number of years. The authors experimented with a number of combinations of drug prophylaxis with residual programmes in an effort to secure the result in a much briefer time. The most satisfactory drugs were pyrimethamine and amodiaquine. A concentrated course of 5 weekly doses of 0·6 gm. of the latter with simultaneous DDT applications caused a persistent reduction of spleen and parasite rates to near zero. The malaria control thus established had a dramatic effect on the total death rate.

J. M. Andrews, J. S. Grant and R. F. Fritz (*Effects of Suspended Residual Spraying and of Imported Malaria on Malaria Control in the U.S.A.*, pp. 839–48) and G. Giglioli (*Malaria Control in British Guiana*, pp. 849–53) review the process of malaria elimination in the U.S.A. and British Guiana, respectively. G. D. Georgopoulos (*Extension to Chlordane of the Resistance to DDT observed in Anopheles sacharovi*, pp. 855–64) shows that the resistance of *A. sacharovi* in Greece to DDT is rapidly extended to chlordane, and C. Garrett-Jones and G. Gramiccia (*Evidence of the Development of Resistance to DDT by Anopheles sacharovi in the Levant*, pp. 865–83) describe the development of resistance by the same species in the Lebanon to DDT. The phenomenon was local and confined to areas of certain housing conditions militating against the continuous maintenance of effective DDT action. The authors consider that a critical range of dosage permitting rapid selection of resistant strains was particularly favoured by these conditions, and recommend much more intense preliminary survey than is usual to foresee and prevent development of such circumstances. H. Trapido (*Recent Experiments on Possible Resistance to DDT by Anopheles albimanus in Panama*, pp. 885–89) shows, however, by precise laboratory experiments that *A. albimanus* in Panama has not developed any resistance either by natural selection in 9 years' treatment, or after deliberate laboratory selection through 70 generations.

[The Editors of the WHO *Bulletin* are congratulated on the selection and collation of this valuable material in one number, which deserves close study by all concerned in malaria control.] *G. Macdonald*

Annecke, D. H. S. **Use of Dieldrin in Control of Malaria.** *East African Med. J.* 1954, Nov., v. 31, No. 11, 491–4.

Four areas in the Transvaal, 2 test and 2 control, were selected for an experiment on the value of dieldrin in the control of *Anopheles gambiae*. A suspension of dieldrin was applied by standard means to give approximately 30 mgm. per square foot and 40 mgm. per sq. ft. in the 2 test areas, the effect being measured by anopheline counts following the application of knock-down sprays in selected huts in test and control areas at monthly intervals thereafter. In neither test area were mosquitoes found until the 5th month when they were few in number, whereas they remained prevalent in the control areas. The effect is said to be comparable to that of 30 mgm. per sq. ft. of gamma BHC; the cost per application is approximately the same and less than that of applying 200 mgm. of DDT per sq. ft. The duration of activity measured in this way is roughly the same as the length of the malaria season in that area. *G. Macdonald*

Thurman, Ernestine B. **The Establishment of a Malaria Control Training Center in Chiengmai, Thailand, with American Cooperation.** *Proc. Forty-First Ann. Meeting New Jersey Mosquito Extermination Ass. & Tenth Ann. Meeting Amer. Mosquito Control Ass.* Atlantic City, N.J. 1954, Mar. 9–12, 163–6.

Ejercito, A., Hess, A. D. & Willard, A. **The Six-Year Philippine-American Malaria Control Program.** *Amer. J. Trop. Med. & Hyg.* 1954, Nov., v. 3, No. 6, 971–80. [21 refs.]

A well-documented statement of the epidemiology and control of malaria in the Philippines is followed by a brief statement of the WHO-sponsored Mindoro Pilot Project, set up to test the possibility of controlling malaria carried by the largely exophilic *Anopheles minimus flavirostris*, by residual insecticides. The full report is still to be published but residual insecticides appear to have been fully effective. A 6-year programme has been drawn up and happily combines the two concepts of control which were until recently rivals in the Philippines. An effort will be made to eliminate malaria as a public health problem by a residual insecticide programme, which will be combined with a long-range programme of more permanent agricultural measures intended to keep malaria under control and eventually eradicate it. The plan is strongly supported by U.S.A. foreign aid funds. The programme will cover 1,050,000 houses being all those in areas where the spleen rate exceeds 10 per cent., and will involve the application of 2 gm. per square metre of DDT once a year for 3 years, and through the agency of 30 Field Units. The programme will be staggered, spraying will first be discontinued in the Mindoro Pilot Project area and experience will thus be gained on its advisability and timing in other areas. The programme is already started and 215,000 houses have been sprayed in 1954.
G. Macdonald

Gillette, H. P. S. **An Attempt at Malaria Eradication in Tobago, B.W.I. 1948–1953.** *Proc. Forty-First Ann. Meeting New Jersey Mosquito Extermination Ass. & Tenth Ann. Meeting Amer. Mosquito Control Ass.* Atlantic City, N.J. 1954, Mar. 9–12, 272–9.

Malaria in Tobago was until recently endemic, predominantly due to *Plasmodium falciparum* and transmitted by *Anopheles aquasalis*, present in

some localities in enormous numbers, counts of 10,000 per night being common in traps. Malariometric data are given from 1941, when the parasite and spleen rates in schoolchildren were respectively 32 and 12 per cent., to 1953. Deliberate attempt at elimination started in 1947 with some exploratory larvicidal work, and this was elaborated in 1948 into a full programme including application of DDT (dose unstated) in houses, the wide use of larvicides, permanent works to eliminate major breeding places and treatment organized by a mobile clinic. In 1953 none of 960 blood films examined in schools was positive, only 7 of 2,492 films taken from selected cases, and normal catches of *A. aquasalis* had been reduced to 1 or 2. Transmission has ended, the potential still exists but recurrence can be prevented at an economical cost. *G. Macdonald*

Floch, H. Sur la cause de la régression du paludisme à la suite des pulvérisations d'insecticides à effet rémanent. [**Cause of Regression of Malaria after Residual Insecticide Spraying**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 4, 549–54. [12 refs.]

It has been contended by Sautet [this *Bulletin*, 1954, v. 51, 343] that regression of malaria is attributable to increased enfeeblement of gametocyte production. Data from French Guiana were used to show that, despite insecticidal control, malaria was not steadily disappearing but was still potentially explosive. The present author, responsible for those data, has contested the deduction from them and produces subsequent figures to invalidate it. Up to 1950 the ratio of gametocytes of *Plasmodium falciparum* to asexual forms had vacillated between 13 and 26 per cent. In the following 3 years it has been 21, 10 and 0 per cent. The process of "no vectors, no trophozoites; no trophozoites, no gametocytes" has been continued to its logical end and represents the real happenings.
G. Macdonald

Vaucel, M. La lutte contre le paludisme au moyen des insecticides à action remanente après 10 ans d'application. [**Malaria Control by Residual Insecticides after 10 Years of Application**] *Rev. Coloniale de Méd. et Chir.* 1955, Feb. 15, v. 27, No. 232, 22–8. [13 refs.]

A general review.

See also p. 586, Afridi *et al.*, **A Simple Biological Method of Testing the Toxicity of Residual Insecticides.**

Jaswant Singh, Nair, C. P. & Ray, A. P. **Studies on Nuri Strain of *P. knowlesi*. III. Morphology and Transmission.** *Indian J. Malariology.* 1954, Sept., v. 8, No. 3, 155–64, 91 coloured figs. on 2 pls. [19 refs.] **IV. Periodicity.** *Ibid.*, 165–85, 7 charts & 2 graphs. [12 refs.] **V. Acquired Resistance to Pyrimethamine.** *Ibid.*, 187–95, 2 charts. [21 refs.]

III. The original strain of *P. knowlesi* isolated by Sinton and Mulligan [this *Bulletin*, 1934, v. 31, 461] appeared to have lost its virulence after a number of years in the authors' laboratory. A fresh strain of the parasite from a Kra monkey was recently obtained [*ibid.*, 1954, v. 51, 19, 20] and has been named the Nuri strain because of its origin in the Nuri Valley in Malaya. In the present investigation an account is given of its morphology, and attempts at transmission are described. More than 200 rhesus monkeys were inoculated intravenously, and thin smears of stained blood

were studied twice daily by methods previously described [Jaswant Singh, Ray and Nair, *ibid.*, 1952, v. 49, 369]. With the exception of certain minor differences the descriptions correspond to those of Mulligan [*ibid.*, 1935, v. 32, 797]. Attention is drawn specially to stippling of the infected cell and to the presence of *tenue* and band forms of the parasite. There are two coloured plates of illustrations. The authors consider that the term "Nuri strain" is justified because of minor variations from the original strain. In transmission experiments, which were unsuccessful, 220 *Anopheles annularis* and 261 *A. stephensi* were dissected. Oöcysts and sporozoites were detected only in 3 mosquitoes of the batch of the former species.

IV. The method of studying the duration of the schizogony cycle was that previously described by Mulligan [this *Bulletin*, 1935, v. 32, 797]. Four monkeys were inoculated intravenously for this purpose and blood smears were taken mostly at intervals of some hours between inoculation and death. Seven stages in the parasite were chosen for enumeration, namely rings, early trophozoites, medium and fully-grown trophozoites, early and late schizonts and finally gametocytes. The counts obtained were expressed as a percentage of the total parasites and at least 100 parasites were counted. The strain was very virulent and death occurred 5 to 6 days after intravenous inoculation. The developmental cycle was found to be of 24 hours' duration in all cases, but there was slight delay or acceleration of schizogony in some cases. The times of appearance of the different forms are recorded. Merozoites numbered 4 to 16 per schizont. The numbers of gametocytes varied during the infection.

V. The authors [this *Bulletin*, 1953, v. 50, 281] previously showed that a strain of *P. knowlesi* described as "avirulent" could be made highly resistant to proguanil and at the same time was cross-resistant to pyrimethamine. A strain of *P. knowlesi* with marked virulence for rhesus monkeys was recently isolated [*ibid.*, 1954, v. 51, 19, 20] and has been used to develop high resistance to pyrimethamine by treatment during blood passage with increasing doses of drug. Monkeys of 2·5 to 5 kgm. were infected by intravenous inoculation of 5×10^6 parasitized erythrocytes. Stained films were used for counting with the aid of an Ehrlich eye-piece as previously described. The dosage of the drug was calculated on the weight of base present and was given orally. Up to a dosage of 1 mgm. drug per kgm. of weight little effect was exercised on the infection, gradual increases up to 20 mgm. per kgm. were finally reached and continued for 1 week or more, but the latter amount frequently proved toxic for the host. Checks for development of resistance were made throughout the course of the work. During its 73 passages over 40 weeks while the parasite was exposed to gradually increasing amounts of drug a phenomenally high resistance to pyrimethamine developed. After 24 passages over a period of $2\frac{1}{2}$ months in the absence of the drug the resistance to pyrimethamine was unimpaired. It was also found that "proguanil, bromoguanide and their active metabolites were highly cross-resistant to this resistant strain, whereas drugs of 4-aminoquinolines, pamaquin, mepacrine, quinine, and M-3349 were all as effective as against the parent strain". *J. D. Fulton*

Ray, A. P., Nair, C. P., Menon, M. K. & Misra, B. G. **Antimalarial Action of the Active Metabolite of Bromoguanide against** *P. cynomolgi*. *Indian J. Malariology*. 1954, Sept., v. 8, No. 3, 209–13.

In continuation of earlier studies on the action of drugs on the course of *P. knowlesi* infection in rhesus monkeys [this *Bulletin*, 1954, v. 51, 1222],

the activities of the metabolite of bromoguanide [*ibid.*, 1954, v. 51, 776], M3349 (a precursor of proguanil) and mepacrine have been compared in the same infection. For this purpose 63 monkeys of weight 2·5 to 6·0 kgm. were used and the procedures were the same as those used in the previous studies. The effectiveness of a substance was finally referred to its quinine equivalent. The minimal effective dose of the three drugs mentioned above was determined, respectively, as 1·2, 20·0 and 5·0 mgm. per kgm. and that of quinine as 20·0 mgm. per kgm. It thus appears that the active metabolite from bromoguanide is about twice as active as the parent compound. The quinine equivalents of the 3 substances mentioned are respectively 16·7, 1·0 and 4·0. *J. D. Fulton*

Corradetti, A., Tentori, L. & Verolini, F. Osservazioni sull'infezione da *Plasmodium berghei* in ratti tenuti a dieta lattea. [**Observations on Infection with** *Plasmodium berghei* **in Rats kept on a Milk Diet**] *Riv. di Parassit.* Rome. 1954, July, v. 15, No. 3, 121–5. [10 refs.] English summary (5 lines).

In view of the conflicting results obtained by various observers in their studies on the effect of a milk diet on the course of infection with different species of *Plasmodium*, the authors carried out experiments on 62 rats, aged 2–3 months, infected with two strains of *P. berghei*, and kept on a diet of milk, with the addition—in some cases—of 0·1 per cent. *p*-amino-benzoic acid. In these experiments it was found that there was no difference in the course of the infection in any of the rats, irrespective of whether they had been fed on a normal diet, or on milk, with or without PAB acid. These results are in contradiction to those obtained by British workers. That the difference was not due to any peculiarity of the Italian strain employed is evident from the fact that identical results were produced in parallel experiments with an English strain.

Among other factors responsible for the divergent results, the authors consider the possible difference in the composition of cow's milk, in which the amounts of PAB and folic acids are variable. It is also pointed out that the vitamin content in the rat's tissues, and especially the intestine, is also subject to variation. The authors conclude that the effect of a milk diet on the development of *P. berghei* in rats depends upon certain factors, which are usually not taken into consideration but actually determine whether milk has a complete or partial suppressive action, or none at all, on *P. berghei*. *C. A. Hoare*

Carrescia, P. M. & Negroni, G. Infezioni da " Plasmodium berghei " in ratti splenectomizzati e mantenuti a dieta lattea. [*P. berghei* **Infection in Splenectomized Rats on Milk Diet**] *Riv. di Malariologia.* 1954, Dec., v. 33, Nos. 4/6, 261–72. [20 refs.]

The English summary appended to the paper is as follows:—

" Observations were carried out on infections by *Plasmodium berghei* in normal and splenectomized rats placed on milk diet. In normal rats the infections were milder than in controls; in splenectomized rats there was a mortality of 50% and no sterilizing immunity was reached."

Sergent, Ed. L'étude immunologique expérimentale du paludisme à *Plasmodium berghei*. [**The Experimental Immunology of** *Plasmodium berghei* **Malaria**] *Arch. Inst. Pasteur d'Algérie*. 1954, Dec., v. 32, No. 4, 277–98. [70 refs.]

Greenberg, J., Taylor, D. Jane & Trembley, Helen L. **The Effect of Milk Diets on the Course of Sporozoite-Induced** *Plasmodium gallinaceum* **Infections in Chicks.** *Amer. J. Hyg.* 1954, Sept., v. 60, No. 2, 99–105.

The effect of three basic diets—(1) dry whole milk with added vitamins, (2) dry skim milk with added vitamins, (3) a synthetic diet adequate for growth—was tested for possible suppressive activity against 2 strains of *P. gallinaceum* in chicks. The chicks were maintained on the diets from the age of one day and infected by sporozoite inoculation when 6 to 13 days old. Contrary to the results obtained by Ramakrishnan *et al.* [this *Bulletin*, 1954, v. 51, 887], the whole milk diet was found to delay parasitaemia by a significant period, whereas neither of the other two diets caused any delay. The addition of various fats to the dry skim milk and the synthetic diet caused some delay in the onset of parasitaemia. The addition of methionine or choline failed to reverse the delaying effect of dry whole milk, but reversal was obtained by the use of cupric sulphate.

R. S. Bray

Greenberg, J. & Trembley, Helen L. **The Apparent Transfer of Pyrimethamine-Resistance from the BI Strain of** *Plasmodium gallinaceum* **to the M Strain.** *J. Parasitology*. 1954, Dec., v. 40, No. 6, 667–72.

When sporozoites of the strain known as the BI strain of *P. gallinaceum* were used to infect chickens, death from growth of late tissue forms resulted before erythrocytic forms were seen in the blood [this *Bulletin*, 1951, v. 48, 620]. Another strain M of the same parasite, on the other hand, gave rise to benign infections without appearance of the late tissue forms. These two strains were passed simultaneously through *Aëdes aegypti* [Greenberg and Trembley, this *Bulletin*, 1954, v. 51, 1227] and the resulting sporozoites caused death of the chick host following appearance of red cell infections and subsequently late tissue parasites. A second passage through mosquitoes gave rise to a benign infection. Several explanations of these results are possible, such as hybridization of strains or swamping of the BI strain which produces fewer gametocytes than the other. The authors have also suggested that gametes of the M strain are endowed with a cytoplasmic factor which prevents multiplication in fixed tissues.

The M strain and a pyrimethamine-resistant BI strain [*ibid.*, 1955, v. 52, 16] have now been passaged together through mosquitoes to test the hybridization hypothesis. The methods followed have been described [*ibid.*, 1954, v. 51, 352]. From the mixed infection 2 different lines were propagated and carried on by mosquito passage. As a result of these passages a strain with benign characters like the M strain but with a high degree of pyrimethamine resistance was isolated. The authors consider that the results are suggestive of " a genetic transfer of drug-resistance from one

strain of *P. gallinaceum* to another ". Other explanations are, however, possible. *J. D. Fulton*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Hewitt, R. I., Gumble, A. R., Wallace, W. S. & Williams, J. H. **Experimental Chemotherapy of Trypanosomiasis. IV. Reversal by Purines of the *in vivo* Activity of Puromycin, and an Amino Nucleoside Analog, against *Trypanosoma equiperdum*.** *Antibiotics & Chemotherapy.* New York. 1954, Dec., v. 4, No. 12, 1222–7. [11 refs.]

Puromycin, an antibiotic derived from *Streptomyces alboniger*, and an amino nucleoside analogue to it, were administered intraperitoneally twice daily to mice inoculated with *Trypanosoma equiperdum*. This treatment alone saves up to 100 per cent., according to the dose, from an otherwise invariably lethal infection. When various purine compounds were also administered the mortality was increased, *e.g.*, from 30 to 90 per cent., and from 0 to 70 or even 100 per cent., according to the dose of each substance given. It therefore seems likely that puromycin and its analogue are antimetabolites of adenine and similar compounds; the effect on *T. equiperdum* would then be due to interference with purine metabolism and the synthesis of nucleic acid or nucleoproteins. [See also this *Bulletin*, 1953, v. 50, 690. In a footnote to the present paper it is pointed out that Achromycin was formerly the trade name of Lederle Laboratories for puromycin. Achromycin is now their trade name for tetracycline which differs from puromycin chemically and is not effective against trypanosomes.] *L. P. Garrod*

da Silva, L. H. P. & Nussenzweig, V. Sôbre uma cepa de *Trypanosoma cruzi* altamente virulenta para o camundongo branco. [**A Strain of *Trypanosoma cruzi* Highly Virulent for Mice**] *Folia Clin. et Biol.* S. Paulo. 1953, Dec., v. 20, No. 3, 191–207, 5 figs. (1 folding). [13 refs.]

The authors describe the behaviour in white mice of a strain of *Trypanosoma cruzi* which proved to be highly virulent for these animals. Strain Y was isolated from man in 1950 and has since been passaged through 109 mice, by intraperitoneal inoculation of 0·2 ml. of blood taken by heart puncture from the preceding donor. The infection rate in mice was 100 per cent., with incubation periods varying from 1 to 8 days, according to the number of trypanosomes in the inoculum and to the age of the mice (19–79 days). The numerical factor also determined the degree of parasitaemia, and the duration of the infection, which was fatal in up to 100 per cent. of the animals after periods from 8 to 58 days. *C. A. Hoare*

Angel Espinoza, L. Algunas consideraciones sobre el comportamiento del Tripanosoma cruzi (Schizotrypanum cruzi) en el Didelphis azarae o Didelphis paraguayensis (zarigueyas, zorro común o raposa). [**Behaviour of *Trypanosoma cruzi* in Opossums**, *Didelphys* **spp.**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1953, v. 10, Nos. 3/4, 27–34, 5 figs. [10 refs.]

In South America opossums are regarded as one of the reservoirs of Chagas's disease, some observers believing that this disease is a zoonosis, with man merely as an incidental host. In order to determine the exact epidemiological rôle of *Didelphys* spp. in Ecuador, the author examined a number of opossums captured in Guayaquil and in the surrounding country, and found 14 naturally infected with *Trypanosoma cruzi*. An examination of various organs of these animals failed to reveal any of the typical leishmanial stages in the tissues, which showed no evidence of pathological changes. Similar results were obtained in laboratory-bred opossums experimentally infected with human strains of *T. cruzi*. On the other hand, the opossum trypanosomes, when inoculated into rats and mice, behaved typically, invading the tissues with the production of the characteristic lesions.

The development of *T. cruzi* in the opossums is thus restricted to the blood stream, in contrast with its behaviour in man and laboratory rodents, in which the tissue stages represent the most important part of the life-cycle, determining the visceral character of Chagas's disease in man.

[There is no mention of the mode of reproduction of *T. cruzi* in opossums: if the trypanosomes multiply in the blood, our conception of the life-cycle of this species will have to be modified.] The paper is illustrated by a number of poorly reproduced photomicrographs. *C. A. Hoare*

Nussenzveig, I., Wajchemberg, B. L., Macruz, R., Netto, A. S. F., Timoner, J. & Azul, L. G. do S. Acidentes vasculares cerebrais embólicos na cardiopatia chagásica crônica. [**Embolic Cerebro-Vascular Incidents in Chronic Heart Disease associated with Chagas's Disease**] Reprinted from *Arquivos Neuro-Psiquiatria*. 1953, Dec., v. 11, No. 4, 386–402.

The English summary appended to the paper is as follows:—

"The authors report eight cases of Chagas' heart disease, proved by positive Machado-Guerrero reaction, in whose evolution there occurred cerebrovascular accidents. They discuss the etiology of these accidents, excluding the common etiological factors and set forth the hypothesis of cerebral embolism from cardiac mural thrombosis. Death occurred in four cases, which were submitted to post-mortem examination; in two cases the necroscopic findings support the hypothesis. In one of the other two were found mural thrombosis in the left ventricle and three cerebral hemorrhagic softenings, but there was simultaneously diffuse cerebral arteriosclerosis and in the other there was a cerebral softening and none of the habitual etiologic factors was found, but there was no thrombosis in the left heart; the possibility is reminded of a weakly adherent to endocardium mural thrombus, which loosed completely. The embolic nature of these cerebrovascular accidents is supported by the authors in the eight cases reported and they emphasize Chagas' disease as an etiological factor of cerebral embolism."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Heisch, R. B. **Studies in Leishmaniasis in East Africa. I. The Epidemiology of an Outbreak of Kala-Azar in Kenya.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, Nov., v. 48, No. 6, 449–64, 3 maps & 1 fig. [12 refs.] Discussion 464–9 [Garnham, P. C. C.; Hoare, C. A.; Bertram, D. S.; Boyd, J. S. K.; Weitz, B.; Napier, L. E.; Heisch, R. B. (in reply)].

Before the Second World War kala azar was almost unknown in East Africa. Since 1941 a number of cases has been reported from various places in Kenya [Fendall, this *Bulletin*, 1953, v. 50, 496] and the present report concerns an outbreak of the disease in the Kitui district in which nearly 3,000 have been reported. The disease is for the most part sporadic, but in a few places it has developed epidemic proportions.

The peak of this outbreak was in June 1953 when 323 cases were diagnosed; the incidence fell to 57 in December 1953, but there was a slight recrudescence in the first half of 1954 with a peak of 102 cases in March. The majority (57 per cent.) of the patients were between the ages of 4 and 18 and 70 per cent. were males.

Investigations on the ecology of this disease in Kenya were undertaken in 1953; the main object was to identify the sandfly vector and to ascertain if there was an animal reservoir.

Over 5,000 sandflies were identified and 15 species recognized, of which about half were new; many of these were dissected and their blood meals identified. Numerous lizards, rodents and other small animals, dogs and jackals were examined. Various forms of sandfly trap were used including net traps baited by Africans, fan-suction traps and oiled traps, in African huts, latrines and other buildings occupied by man. Catches were also made from the inside walls of these buildings. The main species found were *Phlebotomus bedfordi*, *P. antennatus* and *P. schwetzi*; none of these contained human blood. *P. kirki*, in one specimen of which human blood was found, *P. clydei* and several new species of *Phlebotomus* and *Sergentomyia* were also found in smaller numbers; one new species of *Phlebotomus* was of special interest in that it appeared to be closely related to the *major* group.

In termite hills, ventilation shafts harbour large numbers of sandflies. All the above species were found, except *P. bedfordi*, and in addition 2 new species of *Sergentomyia*. Gerbil burrows were also investigated and *P. clydei* was found to be the predominating species; several others were also found.

P. orientalis, a sandfly of the *major* group [all known kala-azar vectors are of this group], was not found in Kitui, although it had been found in a kala-azar focus in Northern Kenya, but a somewhat similar new species is under the greatest suspicion as the vector.

Precipitin test of blood meals of sandflies all showed that the blood was non-human except 1 in 18 *P. kirki*, 2 of 16 *Sergentomyia* sp. nov. 1 and 8 of 37 *Sergentomyia* sp. nov. 2 [now named *P.* (*Ser.*) *garnhami*].

The author considers that the potential vectors are the above *Phlebotomus* sp., the 3 anthropophilic *Sergentomyia*—2 new species and *P.* (*Ser.*) *kirki* [referred to elsewhere as *P. kirki*]—and *P. clydei*. *P. clydei* shows anterior development of leishmania when fed on an infected hamster and is found

widely in the whole area, but it has not been found infected in nature, nor has it ever been caught feeding on man.

So far no animal has been found definitely infected with leishmania in nature in this area, though inoculation experiments with gerbils and mongooses gave tentatively positive results. One of the new species of *Sergentomyia* is found widely, it has been shown to harbour leptomonads and will bite man, though it prefers lizards, but it has not yet been infected artificially.

In the discussion that followed, Professor GARNHAM said that he had seen the earlier cases of kala azar in Kenya; he agreed that the present outbreak was quite a different matter. He did not think that it was at all likely that kala azar had existed in Kitui for a long time, even on a small scale. He emphasized the essential clinical similarity of the disease, wherever in the world it occurred, and he thought that it was the study of the epidemiology that would point to the vector.

It seems fairly certain from the observations made so far that the sandfly vector is not domestic in its habits; he felt that this might be proved by an experiment with domestic insecticides.

He wanted to know if enough was being done to detect all the cases. He thought that the only way to control the outbreak would be by undertaking a widespread treatment campaign.

Dr. HOARE considered that the epidemiological evidence presented strongly indicated that the infection was a zoonosis transmitted sporadically to man. This he thought was possibly true of leishmaniasis throughout the world; it was only when urbanization occurred and the wild reservoirs were driven out that domestic rodents or even man became the main reservoirs of infection.

In towns, transmission was also by "domesticated" species of sandflies.

Dr. BERTRAM wondered if the domestic dog was a source of attraction to sandflies. A large number of dogs had recently been destroyed in an anti-rabies campaign, and it is possible that this had upset the balance between the dog, man and the sandfly, and that the last-named now tended to feed more and more on man.

Brigadier BOYD said that kala azar was endemic in the Southern Sudan and that during the war troops encamped far from villages often became infected; this he thought pointed to the existence of an animal reservoir. Another possibility that was suggested to him by Dr. KIRK was that infection occurred from cases of post-kala-azar dermal leishmaniasis.

Dr. WEITZ thought that the precipitin testing of blood meals might be misleading, as it was often only possible to test against anti-human serum; a negative result might only mean that the blood was already too much digested to give a positive result and not that it belonged to some other species.

Dr. NAPIER said that most of his experience of kala azar had been in Bengal and Assam: he was impressed with the similarities of the epidemiologies of the disease in India and Kenya. The history of this disease in the former countries had been a long series of recrudescences at intervals of about 20 years; at the beginning of each recrudescence a number of acute cases appeared and infection seemed to extend further up the Assam valley.

The picture that the disease in Kitui presents is very similar to that in India and would fit the hypothesis that it is not a new epidemic but a recrudescence of a disease that has recently been going through a quiescent phase in Kenya.

It seems possible that Dr. Heisch and his co-workers have not yet found

either the transmitting sandfly, or the reservoir of infection, if in fact it is other than man, in Kenya. *L. E. Napier*

Heisch, R. B. **The Vector of an Outbreak of Kala-Azar in Kenya.** [Correspondence.] *Nature*. 1955, Mar. 5, v. 175, 433.

A new species of sandfly (called provisionally *Phlebotomus* (*Sergentomyia*) sp. nov. 2) was found in Kenya in the place where a recent outbreak of kala azar has occurred [see above]. Seventy-five specimens were allowed to bite a skin lesion of a patient, in which *Leishmania* was present in high density [see Manson-Bahr below]. The sandflies were dissected 5 or 6 days later and 4 (5 per cent.) were found to contain leptomonads in scanty numbers; in 3 the flagellates had reached the anterior part of the mid-gut. At the same time, 5 *P. clydei* were fed on the lesion, but these did not become infected. The source of all the sandflies used in these experiments was from the field, and the author rightly points out that complete proof that this new sandfly is the vector of the disease in this part of Kenya is still lacking. It is, however, the only anthropophilic species to occur in numbers, it is the only one of such to show natural infections of leptomonads (1 per cent.), and it is apparently capable of being infected in the laboratory. *P. C. C. Garnham*

Manson-Bahr, P. E. C. **A Primary Skin Lesion in Visceral Leishmaniasis.** [Correspondence.] *Nature*. 1955, Mar. 5, v. 175, 433–4.

The author records the demonstration of *Leishmania* in a cutaneous lesion on the leg of an African from an endemic area of kala azar in Kenya. The subject was symptomless when the lesion was discovered associated with generalized lymphadenopathy. *Leishmania* were numerous in the spleen, bone-marrow and lymphatic glands. A total leucocyte count of 5,000 per cmm. supports the view that the infection was recent. The author suggests that the skin lesion may represent a reaction at the site of the bite of the infecting *Phlebotomus*. This case, similar to those reported from the Sudan by Kirk [this *Bulletin*, 1938, v. 35, 866] and Kirk and Sati [*ibid.*, 1940, v. 37, 771], and from Uzbekistan (USSR) by Petrov [*ibid.*, 1938, v. 35, 135] is of considerable interest both as illustrating a possible mode of evolution of kala azar and demonstrating that early cases may be infective for sandflies. *Frederick J. Wright*

Latyshev, N. I. & Kryukova, A. P. [**The Genetic Relationship between various Species of** *Leishmania*] *Problems of Regional, General & Exper. Parasit. & Med. Zool.* Moscow. 1953, v. 8, 211–15, 2 figs. [In Russian.]

The authors point out that up the present no reliable method has been found for the differentiation of the species of *Leishmania*, which are distinguished only by their clinical manifestations. However, even these have features in common, pointing to the genetic affinities between the parasites of cutaneous and visceral leishmaniasis. Thus, Mirzoian (1941) [this *Bulletin*, 1943, v. 40, 295] described in cases of kala azar the appearance of specific cutaneous eruptions, suggestive of mixed visceral and cutaneous leishmaniasis, while Shakhova (1943) has shown that oriental sore may be complicated by the appearance of lymphangitic nodules spatially separated from the original lesion. That such secondary lesions

are not due to re-infection was demonstrated in a person who had been inoculated prophylactically into the left thigh with a culture of *L. tropica*; in this case a secondary "leishmanioma", containing parasites, appeared on the right thigh some time after the original lesion had begun to cicatrize. In the authors' view, these observations indicate that in cutaneous leishmaniasis the pathological process is capable of spreading through the lymphatic system with the formation of secondary lesions.

The affinity between cutaneous and visceral leishmaniasis is also evident from the fact that the inoculation of mice and hamsters with the "moist" or rural strain of *L. tropica* frequently produces a generalized infection. However, mice are relatively refractory to infection with the "dry" or urban strain, therefore its behaviour had to be tested on human beings. In 1935 a volunteer was inoculated into the arm with material from a "moist" ulcer, and developed a sore, which healed after 3 months. In 1943 he was re-inoculated with the same strain at a point near the old cicatrix, again with the appearance of a typical ulcer. On both occasions numerous leishmaniae were present in the lesions. The successful re-infection with the homologous strain showed that immunity to the initial infection disappeared after 7½ years. In 1945 the same person was inoculated intraperitoneally with the culture of a "dry" strain of *L. tropica*, which produced fever and malaise lasting 3 months. Circumstances prevented the search for parasites on this occasion, but the formol-gel reaction was positive, on account of which the symptoms were attributed to infection with *L. tropica*. The diagnosis was supported by the finding of LD bodies in the bone-marrow of a dog, which had been inoculated with the same strain at the same time and by the same route.

Since normally cutaneous leishmaniasis does not generalize in its natural hosts (man and gerbil), the authors advance a hypothesis that *L. tropica* possesses, in addition to dermotropism, a certain degree of viscerotropism, which is revealed only when the parasite is introduced through an unusual route, *e.g.*, into the peritoneal cavity. The authors visualize the evolution of human leishmaniae as proceeding from *L. donovani*, in which viscerotropism is paramount, to *L. infantum*, in which this property is less pronounced, thence to *L. tropica*, in which it is dormant, and terminating in *L. braziliensis*, in which it is totally absent.

In another series of experiments the authors have thrown light on the relationship between human and reptilian leishmaniae. In 1939 the volunteer mentioned above was inoculated subcutaneously with a culture of the gecko flagellate, *L. gymnodactyli*, which produced an allergic reaction at the site of injection. Similar results were obtained in 2 other persons who had recovered from oriental sore, but no reaction was produced in 4 control persons, who had never suffered from this disease. These experiments point to the existence of common antigens in various species of *Leishmania*.

It is suggested that, in view of the genetic affinities between these parasites, it is conceivable that the reptilian leptomonads might be used for prophylactic vaccination against human cutaneous leishmaniasis.

C. A. Hoare

Thorson, R. E., Bailey, W. S., Hoerlein, B. F. & Seibold, H. R. **A Report of a Case of Imported Visceral Leishmaniasis of a Dog in the United States.** *Amer. J. Trop. Med. & Hyg.* 1955, Jan., v. 4, No. 1, 18–22, 1 fig.

"This is the first reported case of visceral leishmaniasis in the dog in the United States. The infection apparently was not autochthonous but

imported, presumably from Greece. During the animal's life in this country he was taken to Florida—one of the few places in the United States where possible vectors, flies of the genus *Phlebotomus*, are found. It is conceivable that the disease could have been spread in areas where these flies are found. Consequently, it seems that specific examination of dogs being imported into the United States from areas where leishmaniasis is endemic might be desirable. In view of the statement by Richardson (1948) that skin scrapings are reasonably reliable in detecting canine infections and the presence of the organisms in the skin in this case, it is suggested that skin biopsy may be an effective method of diagnosis, and a more practical one than the commonly recommended spleen, liver, or bone marrow biopsy."

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

MacArthur, W. P. **The Athenian Plague: a Medical Note.** Reprinted from *Classical Quarterly*. 1954, July–Oct., v. 4 (n.s.), Nos. 3/4, 171–4.

In *The Classical Quarterly*, 1953, v. 47 (= 3), 97, Professor D. L. Page argued that the " plague " of Athens (Thucydides, *The Peloponnesian War*, Book 2, 47 ff.) was measles of a virulent type.

In this note Sir William MacArthur disposes of the suggestion in forthright and very convincing language, and suggests that the disease was in fact louse-borne typhus. Professor Page had evidently been under the impression that louse typhus is connected with rats, and thought that it was at least doubtful if the Athenians were familiar with the black rat, and, further, he thought it improbable that the Athenians were lousy at the relevant time. The author deals with these two points—showing that louse typhus is independent of rats (as is well known) and that lice were known to Aristophanes and louse relapsing fever to Hippocrates.

All the phenomena recorded by Thucydides are consistent with typhus, including the mental state which led the patients to plunge into cold water, the diarrhoea, blindness and (very characteristic) the affections of fingers and toes, with loss of those members. Both Professor Page and the author read the word *spasmos* (σπασμὸς) as " convulsions " rather than " spasms ", and the author concludes that this indicates mental derangement, also common in typhus.

The argument is conducted with all the evidence of learning which Sir William MacArthur brings to his writings, and seems to be irresistible; for " plague " read " louse-borne typhus ", but not " measles ".

Charles Wilcocks

Sutorisová-Štolzová, Margita. Prípad brillovej choroby na Slovensku. (Sporadická, atypická škvrnivka.) [**A Case of Brill's Disease in Slovakia**] *Československ. Hyg., Epidemiol., Mikrobiol., Imunol.* Prague. 1954, v. 3, No. 6, 295–300. [28 refs.] English summary.

See also p. 589, Derrick & Womersley, **The Scrub-Itch Mite of South-East Queensland.**

Parker, R. T., Menon, P. G., Merideth, Ann M., Snyder, M. J. & Woodward, T. E. **Persistence of *Rickettsia rickettsii* in a Patient recovered from Rocky Mountain Spotted Fever.** *J. Immunology.* 1954, Dec., v. 73, No. 6, 383–6, 3 figs.

The authors describe the isolation of *Rickettsia rickettsi* from a lymph node of a person one year after recovery from an attack of Rocky Mountain spotted fever. The strain was identified by complement-fixation tests of the sera of inoculated guineapigs, by the finding of rickettsiae in smears of yolk-sac cultures, and by cross-immunity tests against standard cultures of *R. rickettsi*.

The patient, aged 49 years, had a severe attack of Rocky Mountain spotted fever which was treated by 43 gm. of chloramphenicol over 25 days and by 21 gm. Aureomycin over 12 days, 10 of which overlapped the treatment with chloramphenicol. Rickettsiae were isolated from his blood by guineapig inoculation; the Weil-Felix test with *Proteus OX19* and the complement-fixation test were positive at high and rising titres. The illness was complicated by paralytic ileus, peripheral gangrene and osteomyelitis. After a prolonged stay in hospital recovery was complete and the patient remained in good health afterwards.

The rickettsiae isolated from the gland showed a greatly attenuated degree of virulence as compared with those isolated during the illness. Possible explanations of this loss of virulence are suggested as being prolonged contact with the host-defence mechanism, exposure to the action of the antibiotics, or prolonged storage of the infected gland tissue for 29 months on dry ice before the successful isolation of the strain. The original attempt at isolation had failed because of the development of staphylococcal peritonitis in the guineapigs after inoculation, but fortunately half of the gland was kept in storage.

The authors refer to the evidence of survival of various rickettsiae in experimental animals for varying periods, up to more than 600 days [this *Bulletin*, 1939, v. 36, 466; 1948, v. 45, 889], and to the survival of *R. prowazeki* for many years in man in cases of Brill's disease. *R. orientalis* also survives for considerable periods in some cases [*ibid.*, 1953, v. 50, 207]. [Their suggestion that the loss of virulence in the rickettsiae isolated from their patient may have resulted from contact with the host-defence mechanism finds support in the great rarity, perhaps even the complete absence of transmission of infection to any of the thousands of persons who have come into contact with patients suffering from Brill's disease. This feature of Brill's disease is all the more striking because Murray *et al.* have found that lice can readily become infected by biting patients suffering from the illness (see this *Bulletin*, 1950, v. 47, 729).]

John W. D. Megaw

Weyer, F. Unterschiede im Verhalten mehrerer Stämme von *Rickettsia conori* in der Kleiderlaus. [**Differences in the Behaviour of Various Strains of *Rickettsia conori* in the Body Louse**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Nov., v. 5, No. 4, 477–82, 3 figs.

The author describes the inoculation of body lice by the rectal and intracoelomic routes with rickettsiae of Kenya tick typhus, South-African tick bite fever, and boutonneuse fever. The first two of these behaved in the same way; they multiplied readily in the stomach cells and less readily in the haemolymph, but were not seriously pathogenic for the lice. The rickettsiae of boutonneuse fever were highly pathogenic, causing severe

damage to the mucosa of the stomach and death, within 3–7 days, of the lice.

It is stated that further strains must be studied before a definite opinion can be expressed as to whether the rickettsiae of boutonneuse fever belong to a distinct species or are merely virulent strains of the same species as the other two. *John W. D. Megaw*

Stoker, M. G. P.; Marmion, B. P. **Q Fever. I. Clinical Features and Laboratory Diagnosis** [Stoker]. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, May, v. 48, No. 3, 191–6, 3 figs. [13 refs.] **II. Natural History and Epidemiology of Q Fever in Man** [Marmion]. *Ibid.*, 197–203, 1 fig. [37 refs.] Discussion 203–7 [MacCallum, F. O.; Slavin, G.; Shute, P. G.; Stoker, M. G. P. (in reply); Marmion, B. P. (in reply)].

These two papers ought to be obligatory reading for medical, public health, and laboratory workers in the United Kingdom, where Q fever has not received the attention it deserves.

The first paper contains a succinct description of the clinical features observed in 63 cases of the disease in Great Britain. The cases occurred in the form of two outbreaks and a number of sporadic cases. In one outbreak, in Canterbury, there were 22 patients of whom 16 were febrile for less than 7 days and about two-thirds of the attacks were classed as subclinical; in the other outbreak, in South Kent, 9 of the 16 patients were febrile for less than 7 days but only one of the attacks was subclinical. The rest of the cases were sporadic and only one-third of the patients had fever lasting less than 7 days; obvious pneumonic signs were much more frequent than in the outbreaks.

Isolated cases could hardly be differentiated on clinical grounds from such diseases as primary atypical pneumonia, influenzal pneumonia, or psittacosis, and in cases without pulmonary involvement many nondescript fevers could not be excluded without laboratory tests.

In Great Britain only 163 cases, with 4 deaths, have been diagnosed since 1949, but a follow-up in Kent suggested that 16 per cent. of all pneumonias and undiagnosed fevers were due to Q fever. Tests of blood donors over a wide area suggested that 2–4 per cent. of the adult population had been infected at some time. In some towns the figure was as high as 25 per cent. so that there were probably many undiagnosed cases.

[Failure to diagnose a case nearly always means failure to give the proper treatment by the broad-spectrum antibiotics. Penicillin and the sulphonamides are useless in Q fever.]

Many will agree with the author's view that the original name of the causal agent, *Rickettsia burneti*, may be retained instead of *Coxiella burnetii*, at any rate till a general reclassification of the rickettsiae has been found desirable, because the organism differs no more from the type species than do *R. tsutsugamushi* or *R. quintana*.

In the discussion of the paper Dr. F. O. MacCallum stated that in tests at the Virus Reference Laboratory in 1952 and 1953 only 0·65 per cent. of nearly 3,500 sera suggested recent infection with *R. burneti*. In reply Dr. Stoker suggested that the lowness of the rate may have been due to the preponderance of urban dwellers among the population sampled.

The second paper consists of a brief critical review of the literature dealing with the natural history and epidemiology of Q fever in man. It is well documented with 37 references to the literature and it will be found an excellent introduction to the study of the subjects with which it deals. There is, however, disappointingly little reference to the work done in

England by the authors of these two papers and by Dr. George Slavin. Summaries of the chief papers by these workers will be found in this *Bulletin*, 1953, v. 50, 299, 501 and 617; and 1954, v. 51, 907.

John W. D. Megaw

de Filippis, V. Episodio epidemico di febbre Q in collettività in provincia di Varese. [**An Outbreak of Q Fever in a Community in the Province of Varese (Italy)**] *Ann. d. San. Pubblica.* Rome. 1954, Sept.–Oct., v. 15, No. 5, 979–92, 2 maps & 2 graphs. [18 refs.] English summary (9 lines).

The author describes an outbreak of Q fever in which 24 persons were attacked during the period March 1 to 15, 1954, in the village community of Travedona in the province of Varese in Lombardy. The source of infection was a cow which gave birth to a healthy calf 12 days before her owner, D. T. C., employed in an adjacent shoe factory, was attacked on the 1st March. Within the period March 3 to 7, attacks occurred in 3 members of the same household and in 2 persons living next door, one of whom was employed in the same factory as D. T. C. In the period March 8 to 15 no fewer than 16 other workers employed in the same workshop as D. T. C. were attacked and only 5 of the 23 men working in this room escaped. None of the other 30 persons working in adjoining rooms was attacked. The remaining 2 cases occurred in circumstances which strongly incriminated D. T. C. as the source of the outbreak among the factory workers. The persons affected were the owners of a small factory not far away; they had come into close contact with D. T. C. on the day previous to the onset of his illness when he visited them to adjust a machine in their workshop, and both of them were attacked 7 and 9 days later, respectively. The other 5 or 6 men employed in this factory were not attacked; they had not come into close contact with D. T. C.

The author's interpretation of these events is that D. T. C. became infected through contact with the cow and that the other persons were infected by inhaling droplets from his respiratory tract. It is assumed that he was infective during the incubation period of his illness and that after a single passage from him to other persons the causal agent ceased to be infective.

[This hypothesis seems to be the most likely explanation of the infection of the 17 persons attacked in the two factories from March 8 to 15, but it would be necessary to assume that D. T. C. was infective several days before the onset of his illness if he is to be held responsible for the illness of the 5 persons who fell sick 3–5 days after him. Incubation periods of less than 5 days have rarely been recorded and it is easier to believe that local infection may have persisted for a few days after the birth of the calf than that a patient should be capable of transmitting infection some days before symptoms of his illness appeared. There is, however, strong evidence of the occurrence of person-to-person transmission by contact with a person one day before the onset in the cases of the two owners of the small factory, and the possibility of such transmission from persons in earlier stages of the incubation cannot be excluded.]

The clinical features of the disease are described; special mention is made of severe and prolonged prostration after the illness. The complement-fixation test was positive with 21 of 24 sera tested. The incriminated cow reacted at a titre of 1 in 64. Aureomycin [chlortetracycline] was found highly effective in treatment.

John W. D. Megaw

Takano, K., Kitaoka, M. & Shishido, A. **Complement Fixation in Q Fever. III. Serological Survey of Human Sera in Japan.** *Japanese J. Med. Sci. & Biol.* 1954, Aug., v. 7, No. 4, 417–25. [25 refs.]

During the period March 1952, to March 1953, 954 samples of human sera from 17 prefectures of Japan were examined by the complement-fixation test for Q fever. From 8 prefectures 35 or more samples were obtained and positive reactions were observed in only 3 of these. From Kumamoto 29 were positive among 134 tested; from Kanagawa 8 of 143 were positive and from Okayama 2 of 35 were positive. Among these 39 sera, which came from 24 persons, only 5 reacted at titres of 1 in 32 or higher; the others reacted at 1 in 8 or 1 in 16. All the sera tested came from persons working in slaughter houses or otherwise having contact with livestock. The only person whose serum showed a titre higher than 1 in 32 was a rancher who reacted at 1 in 256; he gave a history of having had an attack of fever a short time after one of his goats, recently imported from England, had shown symptoms of febrile catarrh early in 1951. Two of the other human reactors gave a history of having had an attack of respiratory infection with fever. Apart from these suspicious attacks there was no clinical evidence of the occurrence of the disease in man in Japan.

In each of the tests a control was carried out with epidemic or murine typhus antigen and it was found that nearly half of the sera reacting with Q fever antigen also reacted with one of the typhus antigens. There was no opportunity of attempting to isolate rickettsiae.

Mention is made of a paper in Japanese in which a description is given of a survey of livestock in Japan; among 1,350 cattle 3 gave positive complement-fixation reactions for Q fever; 2 of 17 goats and 3 of 5 camels reacted. *John W. D. Megaw*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, actiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

See also p. 584, Kershaw *et al.*, **Studies on Arthropod Survival. I.—The Pattern of Mosquito Survival in Laboratory Conditions.**

Romero, A. & Trejos, A. Clínica y laboratorio de la fiebre amarilla en Costa Rica. [**Clinical and Laboratory Studies of Yellow Fever in Costa Rica**] *Rev. Biologia Trop.* San José, Costa Rica. 1954, Dec., v. 2, No. 2, 113–68, 1 map & 11 charts. [10 refs.]

The English summary appended to the paper is as follows:—

"A brief chronological account is given of the epidemic of yellow fever in Costa Rica, showing its course in the country.

"The cases observed are discussed, and analyses are made of the relation between morbidity and mortality and the vaccination employed; of the general symptomatology observed in the patients entering the adult infecto-contagious case ward of Hospital San Juan de Dios, San José; and of all the clinical tests made in the same Hospital.

"Some prognostic and diagnostic considerations are presented, with discussions of the therapy used.

"The following conclusions are reached:

"a. The recent yellow fever epidemic in Costa Rica was a fairly serious one, having reached a mortality of 37% among non-vaccinated cases.

"b. Vaccination proved beneficial even in those cases in which it did not prevent infection.

"c. Early diagnosis and treatment, before the 5th day of illness, improves the prognosis of the case.

"d. In any epidemic of jungle yellow fever *Plasmodium* infection should be checked for, as regions where *Haemagogus* is found are, in general, malarial.

"e. Urine examination, blood urea, hemogram, and especially prothrombin percent tests are not only useful for diagnosis, but have great value in prognosis.

"f. Prothrombin time tests are valuable in the conduct of treatment.

"g. As deduced from the clinical observations and laboratory data at hand, the most adequate treatment consists of preventing dehydration, and supplying vitamins, especially high doses of vitamin K as early as possible."

Romero, A. Fiebre amarilla en niños menores de doce años. [**Yellow Fever in Children Under 12 Years**] *Rev. Biologia Trop.* San José, Costa Rica. 1954, Dec., v. 2, No. 2, 169–74.

The English summary appended to the paper is as follows:—

"1. A brief analysis is presented of 16 cases of yellow fever in children under 12, observed in the Infecto-contagious ward of Hospital San Juan de Dios, San José during the 1951–52 epidemic in Costa Rica.

"2. The low mortality among children (6·2%) is stressed, in contrast to that among adults (27·4%).

"3. Symptomatology in children was the same as in adults, although in general milder; the one difference being that in none of the 16 cases was clinical icterus or subicterus observed.

"4. The benignity of yellow fever in children is noted, and brief report is made of a serious case which evolved rapidly towards recovery."

Porterfield, J. S. **The Haemagglutination-Inhibition Test in the Diagnosis of Yellow Fever in Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, May, v. 48, No. 3, 261–6. [10 refs.]

The author gives details of a haemagglutination-inhibition test for the detection of yellow-fever antibody in human sera and compares the results of this test with those of the mouse-protection test on 109 such sera collected in various parts of Nigeria. In the haemagglutination-inhibition test the antigen employed was an acetone and ether extract of serum derived from a rhesus monkey infected with the Asibi strain of yellow-fever virus, and serial dilutions of this antigen agglutinated 0·5 per cent. chick cells to a titre between 1 in 3,200 and 1 in 6,400; from the human sera under test non-specific inhibitors of haemagglutination had been removed by acetone extraction; Perspex haemagglutination plates were used throughout.

Results of haemagglutination-inhibition tests (inhibition or no inhibition of haemagglutination by serum diluted 1 in 10 or more) and of mouse-protection tests (serum protecting or failing to protect mice against 100 LD50 virus intracerebrally) showed agreement in 90 per cent. of cases. Moreover, in one group of 28 sera obtained 4 months after a vaccination

campaign, in which 17D virus vaccine had been administered by the scratch technique. both tests were positive in 18 cases, both negative in 7. These 18 positives showed the antibody thus demonstrated to be different from the complement-fixing antibody, which is normally absent from the sera of persons immunized with 17D vaccine.

Although the results of the haemagglutination-inhibition test have closely paralleled those of the mouse-protection test, however, there is no great likelihood of the former replacing the latter—this because so far there is little information on the specificity of the former and because the latter is generally recognized as specific in the diagnosis of yellow fever. The probability is that the haemagglutination-inhibition test may provide its greatest service in serological survey work and in preliminary screening of sera. *G. Stuart*

Lartigaut & Lartigaut, Denise. Encéphalite vaccinale du nourrisson après vaccination contre la fièvre jaune. [**Encephalitis following the Vaccination of an Infant against Yellow Fever**] *J. Méd. de Bordeaux.* 1954, Dec., v. 131, No. 12, 1388.

The case of encephalitis reported in this communication followed the inoculation, on 12th May 1954 in France, of a 3-months-old infant with 17D virus vaccine. On the 8th post-vaccination day the infant became restless and feverish. By the 11th post-vaccination day the temperature was 38·2°–39·9°C. and there were occurring 4 or 5 times daily slight convulsive attacks, with trismus, deviation of the eyes to the right, and transient muscle spasms in the upper and lower extremities. Examination in the evening of the 11th post-vaccination day revealed: slight miosis; marked rigidity of the neck; Kernig and Brudzinski signs positive; reflexes brisk; considerable vasomotor disturbances; marked " meningeal streak "; no other abnormal physical signs; no bulging of the anterior fontanelle. On lumbar puncture the cerebrospinal fluid was clear and under increased pressure; it contained 40 cells per 1 cmm. (lymphocytes 90 per cent., polymorphonuclears 10 per cent.); it had albumin, sugar, and chloride contents of 60, 70, and 750 mgm. per cent., respectively; it was free from micro-organisms. On the 12th post-vaccination day the temperature remained at 40°C. throughout and there occurred another convulsive attack. Thereafter defervescence was rapid and progressive; no further convulsive attacks occurred; all signs of meningeal irritation disappeared. By 27th May, one week after the onset of illness, the child had completely recovered.

The authors draw attention to the occasional occurrence in infants less than one year old of such complications of yellow fever vaccination, even when 17D vaccine is used; they stress, however, that these complications are of a benign type, clearing up spontaneously within one week and leaving no sequelae.

[Between August 1952 and December 1954 there have now been reported 11 cases of meningo-encephalitis associated with 17D vaccination—7 in France, 3 in England [this *Bulletin*, 1955, v. 52, 37], and 1 in Nigeria (*ibid.*, 355).] *G. Stuart*

DENGUE AND ALLIED FEVERS

ISHII, N., NAKAYAMA, A. & ISHII, Y. **Biological Observations on the Mosquito,** *Aedes albopictus*. *Yokohama Med. Bull.* 1954, Aug., v. 5, No. 4, 275–81, 10 figs.

Aëdes albopictus is widespread in Japan, occurring commonly during the months of July to September. Laboratory experiments have shown it to be capable of transmitting dengue fever in Japan.

The authors briefly describe the development of this mosquito from egg to adult and give data showing the monthly prevalence of the sexes of this species and also of *Aëdes togoi*. From some simple laboratory observations they conclude that *Aëdes albopictus* overwinters in the egg and adult stages, that *Aëdes togoi* overwinters in the egg and larval stages and that the optimum temperature range for adults of both species is between 15°C. and 25°C. *H. S. Leeson*

RABIES

DI SAPIO, G. & MELE, E. Un quindicennio di vaccinazioni antirabbiche nel Laboratorio Micrografico d'Igiene di Napoli. [**Fifteen Years of Anti-Rabies Vaccination in Naples**] *Riv. Istituto Sieroterap. Ital.* 1954, Nov.–Dec., v. 29, No. 6, 544–52. [24 refs.]

The English summary appended to the paper is as follows:—

"The clinical, epidemiological and laboratory data collected in 15 years (1939–1953) of antirabic vaccinations are reported.

"26,226 subjects have been treated with phenolized vaccine and the effectiveness of the Fermi method has been confirmed."

NOVI SAD. **Annual Report of the Antirabic Treatment in the Pasteur Institute in Novi Sad for the Year 1953** [NIKOLICH, M., Director]. 16 pp. 1954. [In Serbian & English.]

This article records the results of antirabies treatment in Yugoslavia, where since 1927 the Hempt method has been applied. The vaccine, a 10 per cent. ether-phenol preparation of the brain and spinal cord of sheep infected with fixed virus rabies, is distributed in 5 cc. ampoules to a number of antirabies Centres, where treatment is administered over a 3-day or a 6-day period, according to the severity of the wounding. The contents of one ampoule are administered daily, on each of 3 consecutive days, to those persons with superficial wounds, and, on each of 6 consecutive days, to those with deep wounds. The vaccine retains its antigenic potency for 12 months after the date of manufacture or issue.

Between the years 1927 and 1953 inclusive 269,039 persons received treatment, and of that number 274 (0·10 per cent.) died of rabies, 23 (0·008 per cent.) developed paralytic accidents.

During 1953 alone 13,447 bitten persons were treated, and of these 6 (0·04 per cent.) died of rabies; no paralytic accident complicated treatment. The paper provides a detailed analysis of the 1953 figures. All 6 deaths occurred among 10,307 persons treated within the first 4 days after exposure to risk (a mortality of 0·058 per cent.); of these 6, there were 3 (0·028 per cent.) among 10,457 persons bitten by dogs, 2 (0·146 per cent.) among 1,362 bitten by cats, and one (2·97 per cent.) among 34 bitten by wolves. Among 936 persons, bitten by animals proved by laboratory investigation to have

been rabid at the time of biting, one bitten deeply on the hand through naked skin died of rabies (0·10 per cent.); among 1,053 persons bitten by clinically rabid animals, there was no death; among 10,527 persons bitten by probably rabid animals, 5 (0·04 per cent.) died of rabies: 4 among 156 bitten deeply on the head, 1 among 1,530 bitten superficially on the hand.

Basing his opinion on experimental evidence and on the results of recent treatment of bitten persons at 3 selected antirabies centres by a modification of the standard Hempt method, the author believes the value of antirabies vaccination to be increased and the risk of paralytic accident reduced if the amount of vaccine considered necessary for protection is administered within a shorter, than over a longer, period of time. *G. Stuart*

Türkay, N. Türkiyede 1953 yili içinde Semple kuduz aşisi tatbikati ile Ankara Rafik Saydam Merkez Hifzisihha Enstitüsünde Högyes-Philipps metodu ile aşi tatbikatindan alinan neticeler. [**Results of Antirabies Vaccination carried out in 1953 by the Högyes-Phillips Method at the Rafik Saydam Central Institute of Hygiene, Ankara, and by the Semple Method in Turkey generally**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1954, v. 14, No. 1, 62–78. French summary.

During 1953 in Turkey 615 persons were registered for antirabies treatment by the Högyes-Phillips method and 1,927 by the Semple method at the Central Institute of Hygiene, Ankara, while 15,297 were registered for treatment by the Semple method at one or other of the 127 antirabies centres established in that country.

Of the 615 persons selected for treatment by the Högyes-Phillips method, 583 were considered to be at risk and received the vaccine (1 per cent. emulsion in physiological saline solution of the brain substance of rabbits dead of fixed virus rabies) in a dosage and over a period determined by the site and severity of their wounds. Of the 583 treated, 3 (0·51 per cent.) died of rabies: 1 among 417 bitten by dogs (0·23 per cent.), 1 among 92 bitten by cats (1·08 per cent.) and 1 among 5 bitten by wolves (20 per cent.). All 3 had received severe wounds through the naked skin from animals suspected, but not proved, to have had rabies at the time of biting; 2 had been bitten on the head—one by a dog and one by a wolf—and one had been bitten on the hand by a cat. Two (0·50 per cent.) of the deaths—from dog bite and wolf bite, respectively—occurred among 395 persons treated within 4 days of the time of biting, 1 (20 per cent.)—from cat bite—among 5 treated more than 21 days after date of the bite. The incubation periods of rabies in these 3 cases were, respectively, 18, 44, and 95 days following the dog bite, the cat bite, and the wolf bite, the onset of symptoms occurring, respectively, 2, 7, and 69 days after completion of treatment.

Of the 17,224 persons attending the various centres for treatment by the Semple method (5 per cent. suspension in 0·5 per cent. phenolized physiological salt solution of emulsified brain of sheep inoculated with fixed virus rabies), 14,141 were considered to be at risk and treated with vaccine in an amount and over a period of time determined by the site and gravity of their wounds. Of those treated 6 (0·042 per cent.) died of rabies—all 6 (0·057 per cent.) were among the 10,489 persons bitten by dogs suspected, not proved, to have had rabies at the time of biting. Of the 6, one (0·126 per cent.) of 792 bitten on the head, and five (0·155 per cent.) of 3,214 bitten on the upper extremity—all had been bitten through naked skin; 4 had arrived for treatment only a day or two before they developed symptoms of rabies, and were thus excluded from the "failures of treatment". True failures constituted 2 (0·014 per cent.) of the total number treated.

No paralytic accident complicated the application of either method of treatment.

G. Stuart

Kruglick, J. S. **Dog Bite and its Complications.** *Arizona Med.* 1955, Jan., v. 12, No. 1, 13–15.

In this article the author provides a short review of recent literature on the antirabies treatment of man, and discusses, *inter alia*, the indications for specific post-exposure treatment and the various types of reaction which may complicate such treatment. Moreover he illustrates the value of antihistamines and cortisone in dealing with the more serious nervous complications by giving details of the following recent case of encephalomyelitic reaction, which he successfully treated by these means.

The case occurred in a 13-year-old boy during June 1954. At the 10th injection the patient complained of headache; after the 11th injection he developed fever and projectile vomiting; and on the following day he lapsed into a coma. On clinical examination the patient was found to have a temperature of 103°F.; he was stuporous and failed to respond; he had stiffness of the neck and back and showed marked hamstring spasm; there was a left facial paralysis and paralysis of the bladder; his blood pressure was 180/100 and he had a ++ choking of the optic discs. Treatment consisted of benadryl and cortisone, together with symptomatic treatment such as fluids for hydration, suction for mucus, the usual measures for fever, and hypertonic solutions for the hypertension. At the end of the third day of such treatment the temperature fell, the blood pressure dropped, the mucus lessened and the patient was able to take solid food and fluids. Recovery was complete and uneventful.

[On the value of antihistamine drugs in the treatment of neuro-paralytic accidents divergent views have been expressed: Pickar and Kramer (this *Bulletin*, 1949, v. 46, 543) and Slipyan (*Ann. Allergy*, 1948, v. 6, 428) considered that the course in their cases was favourably influenced. Halle (*Med. Surg. J.*, 1948, v. 101, 47) and McFadzean and Choa (this *Bulletin*, 1954, v. 51, 577) found that no discernible effect was exerted. The successful employment of corticotrophin and cortisone in the treatment of such accidents has been reported by Fernandez, Sora and Machado (*Arch. Hosp. Univ. Habana*, 1951, v. 3, 685), by Garrison (this *Bulletin*, 1952, v. 49, 615), by Stillman and Ganong (*New England J. of Med.*, 1952, v. 246, 293) and by McFadzean and Choa (this *Bulletin*, 1954, v. 51, 577.]

G. Stuart

Pimentel, D. **The Control of the Mongoose in Puerto Rico.** *Amer. J. Trop. Med. & Hyg.* 1955, Jan., v. 4, No. 1, 147–51.

"Warfarin, red squill, barium carbonate, strychnine, ANTU, zinc phosphide, microfine arsenic trioxide, thallium sulfate, sodium fluoroacetate ('1080'), and ground glass were tested against a total of 208 mongooses. Only compound '1080' fed for one dose at 80 mg./kg., and thallium sulfate cumulatively fed at a dosage of 60 mg./kg. for three feedings were effective against the mongoose.

"In two field control experiments in Puerto Rico, thallium sulfate on sun-dried fresh fish effected about a 90 per cent reduction of the mongoose population at an estimated cost of about 17 cents per acre. In another experiment on Pineros Island near Puerto Rico, all adult mongooses apparently were killed by the thallium sulfate poison bait method. Some

very young animals survived, as indicated by trapping of several adolescent mongooses on the Island 4 months after the poisoning experiment."

[See also this *Bulletin*, 1953, v. 50, 303.]

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Ahmad, N. & Purshottam, N. **Epidemiology of Plague.** *Pakistan J. of Health.* 1954, July, v. 4, No. 2, 75–86. [58 refs.]

A short general review.

Quan, S. F., Kartman, L. & McManus, A. G. **Studies on** *Pasteurella pestis* **in Fleas: II. Experimental Blocking of** *Xenopsylla cheopis* **with an Avirulent Strain of** *P. pestis. Science.* 1954, Dec. 31, v. 120, 1101–2, 1 fig.

The authors have added another to the repeated experimental confirmations of the classical finding by Bacot and Martin, in 1914, that fleas whose proventriculi have become blocked by masses of *Pasteurella pestis* are specially effective vectors of plague. The present experiments consisted in allowing *Xenopsylla cheopis* to feed through chick membranes on heparinized human blood [this *Bulletin*, 1955, v. 52, 360] containing known numbers per cc. of *P. pestis*. By weighing the fleas before and after feeding the number of bacilli ingested could be estimated. By triturating and making plate cultivations of samples of the fed fleas at intervals it was possible to find the rate of multiplication or reduction in numbers of the bacilli in the fleas.

The avirulent strain "A1122" of *P. pestis* was employed with a view to finding whether any increase in virulence would occur during the passage through the fleas. With this strain very large numbers of viable bacilli were needed to establish infection in the fleas; for example, 5 days after a blood meal containing 400 million bacilli per cc. only 2 out of 32 fleas yielded positive cultures, but when the number of bacilli was raised to 720 million or over, 80 per cent. of the fleas became positive. With virulent strains it has been found that fleas become infected after biting persons whose blood contains at least 10,000 viable *P. pestis* per cc.

In some of the fleas proventricular blocks were found as early as the 2nd day after the infecting meal, but the rate of blocking did not reach 30–40 per cent. till 6–9 days after feeding.

The strain remained completely avirulent after passage through the fleas; 60 or more of the infected fleas failed to infect a white rat on which they had fed continuously for 15 days.

Investigations into the behaviour of other strains of avirulent *P. pestis* or of other bacteria after ingestion by *X. cheopis* are in progress.

John W. D. Megaw

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Learmonth, A. T. A. **A Method of plotting on the same Map Health Data on both Intensity and Variability of Incidence, illustrated by Three Maps of Cholera in Indo-Pakistan.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 345–8, 3 maps.

The medical cartographer normally wishes to display data on both the geographical distribution and the variation in time of disease. He typically uses two separate maps for this purpose and often achieves only confusion when he tries to condense the material on one. The author presents data on cholera in Indo-Pakistan on one map without this result. He uses shading, the density of which indicates differing intensities of incidence, while the direction shows the variability as measured by the standard deviation. Three grades of intensity of incidence and three grades of variability are thus cross-classified to yield 9 combinations from high incidence with high variability to low incidence with low variability. The information on the map is supplemented by histograms showing the frequency distribution, of standard deviations and means in the districts studied. More detailed subdivision of the degrees of intensity and variability demand the production of separate maps for which a scheme is shown.

[The mechanism of the conjoined map is of special interest. The one produced is clear and its meaning is readily grasped. It gives more information than two maps in that it is easy at once to appreciate the relationship between intensity and variability. The mechanism is an improvement on most of those current and deserves examination by cartographers of any disease.] *G. Macdonald*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Horwitz, Eliana, Artigas, J. & Silva, R. Algunas observaciones sobre enteroparásitos en agua de riego. [**Some Observations about Intestinal Parasites in Irrigation Water**] *Bol. Chileno de Parasit.* 1954, Oct.–Dec., v. 9, No. 4, 99–105. [13 refs.]

The English summary appended to the paper is as follows:—

"A study of the role of irrigation water as a vehicle of *Entamoeba histolytica* cysts is realized, analyzing 480 liters of drain-water from the canals carrying it to the orchards that supply the city of Santiago. The microscopic observation demonstrated the existence of enteroparasite eggs and cysts, some of them with the characteristics of *E. histolytica*.

"A culture was performed in Balamuth medium with relative anaerobiosis, developing trophozoites, resembling *E. histolytica*, that did not resist

temperatures inferior to 37·5°C. and could not develop in sub-cultures. The hematophagic capacity was verified by adding human blood to the test-tubes.

"In the experimental inoculation in hamsters and young cats, lesions were found in which the existence of amebic trophozoites was not possible to verify, but a trophozoite resembling *E. histolytica*, surrounded by red cells, was observed on the cecal mucosa surface of a hamster, 7 days after inoculation.

"The reasons that could explain the alterations in the ability of the trophozoites to invade the tissues are discussed."

[See also this *Bulletin*, 1954, v. 51, 582.]

Ray, H. N. & Sen Gupta, P. C. **A Cytochemical Study of** *Entamoeba histolytica*. *J. Indian Med. Ass.* 1954, Sept., v. 23, No. 12, 529–33, 2 figs. on pl. [12 refs.]

The authors describe the results of a biochemical study on *Entamoeba histolytica*, in material consisting of smears of samples obtained from cases of amoebiasis by sigmoidoscopy, faecal specimens, cultures and tissue sections. The preparations were treated by various specific cytochemical methods. The results of this study are as follows. Mitochondria and Golgi apparatus are shown, by supravital staining, to be present in the endoplasm of the trophozoites, which are also rich in ribonucleic acid, while small amounts of desoxyribonucleic acid are found in the nucleus. The chromatoid bodies in cysts are made up of ribonucleic acid (RNA) and desoxyribonucleic acid (DNA), as well as phosphatases. Alkaline phosphatase occurs in the nuclear membrane and karyosome, as well as in the cytoplasm, while acid phosphatase is also present in the nucleus. The presence of this enzyme is also detectable in cysts. The endoplasm of both trophozoites and cysts contains glycogen, and minute amounts of lipids are scattered through the endoplasm of the amoebae.

The authors then discuss the significance of the elements detected in *E. histolytica*. The mitochondria appear to be connected with oxidation-reduction activities and digestion of carbohydrates (*e.g.*, starch granules). The Golgi apparatus is said to act as a mechanism protecting the amoeba against toxic substances. In the cytoplasm the DNA granules might play a rôle in the synthesis of proteins, nucleic acids and the chromatoids, which represent stored protein. Alkaline phosphatase represents the enzymatic centre for the synthesis of nucleic acid and protein, and is responsible for processes connected with absorption or secretion of substances into and out of the cell body; it also appears to play a part in excystation. The nuclear phosphatases probably protect the genes against phosphorylating agents, and are also connected with the synthesis of nucleic acid.

The appearance of the various cytological elements is depicted in figures.

C. A. Hoare

Blumenthal, H., Michaelson, J. B., DeLamater, J. N. & Rennie, P. J. **Studies on the Nutrition of** *Endamoeba histolytica*. **II. Egg Phosphate.** *Exper. Parasit.* New York. 1954, Sept., v. 3, No. 5, 458–63, 1 fig.

The authors [this *Bulletin*, 1954, v. 51, 1246] have shown that a *dl*-alanine buffer can replace the usual phosphate buffer in the Boeck-Drbohlav medium for culturing *E. histolytica*. In the present investigation the rôle of egg slant as a source of phosphate has been investigated, by means

of the medium described by Nelson (*J. Parasitology*, 1948, v. 34, No. 6, Section 2 (Supplement), p. 1) with modifications in the buffer system and maintenance of tonicity equivalent to 0·85 per cent. NaCl by addition of this substance. The egg residue which results from the preparation of Nelson's medium was also used in suspension as a culture medium with phosphate or alanine buffer plus rice starch. Two strains of *E. histolytica* accompanied by mixed bacterial flora were employed. Transfers were made at 48- or 72-hour intervals and a medium was considered capable of supporting growth satisfactorily when continuous cultures could be maintained on it for 21 days. The only modification of Nelson's medium which supported growth was that in which ionic phosphorus was present with alanine in the slant. For the composition of the various media tried the original article should be consulted.

It appeared that alanine and phosphate in diffusible form of concentration ranging from M/10 to half that strength were necessary to support *E. histolytica* under the conditions employed, but other small organic molecules could probably replace alanine. The reason for the failure of *E. histolytica* to grow in certain media is discussed. *J. D. Fulton*

Regonesi, C., Muranda, M. & Artigas, J. Técnica del fijador con alcohol polivinílico en el diagnóstico de la amibiasis y otras enteroparasitosis. [**The PVA Fixative in the Diagnosis of Amoebiasis and other Intestinal Parasites**] *Bol. Chileno de Parasit.* 1954, Oct.–Dec., v. 9, No. 4, 105–9. [20 refs.]

The English summary appended to the paper is as follows:—

"The authors study the technique of PVA fixative applied to the preservation of stools. A comparative analysis was made with other procedures, as for example, direct examination and concentration technics in specimen preserved with saline-formol. 167 stools of patients suspected to be infected with *Entamoeba histolytica* were examined. It is pointed out the frequency in which trophozoites of *Entamoeba histolytica*, *Entamoeba coli* and *Endolimax nana* were demonstrated in the specimens preserved in PVA fixative as a contrast to those preserved in saline-formol.

"According to the opinion of other authors, the technique seems to be valuable for the identification of trophozoites but of little value in the preservation of cysts and eggs of parasites [see this *Bulletin*, 1954, v. 51, 117]."

Lawless, D. K. **A Preliminary Report on a Rapid Permanent Mount Stain Technic for the Diagnosis and Recognition of Intestinal Protozoa.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 10, 1202–4.

Wet-smear preparations of intestinal protozoa are temporary and iron-haematoxylin methods are difficult and time-consuming. The author describes a staining method which is claimed to be as effective and rapid as wet-smear techniques and as permanent and as fine in detail as iron-haematoxylin methods. The technique is simple, few ingredients are required, no ripening is necessary and preservation-fixation properties are combined with the dyes.

A solution is prepared which consists of 50 cc. of acetone, 50 cc. of glacial acetic acid, 10 cc. of formaldehyde solution, USP, and 890 cc. of Schaudinn's solution. For use, 2·5 gm. of acid fuchsin and 1 gm. of fast green FCF are added and the mixture is stored in a stoppered brown bottle.

It appears to be stable after 6 months' use and uniform staining is obtained with stools, regardless of *p*H or consistency.

A thin smear of faeces (which should not be allowed to dry) is covered completely with the solution and heated gently until steam rises. It is then immediately washed gently in tap water and then placed for 30 seconds each in 50 per cent. and 70 per cent. alcohol and for 15 seconds each in 95 per cent. and absolute alcohol. The preparation is cleared in xylol for 1 minute and mounted in balsam.

The background is bluish-purple and parasites are a variable blue to purple. The staining characteristics are similar to those of iron-haematoxylin preparations and detail is particularly clear in nuclear and chromatoid material. Cysts and trophozoites alike stain well.

It is stated that a series of slides stained in this way have showed no change after 10 months. *H. J. O'D. Burke-Gaffney*

Purandare, N. M. & Deoras, S. M. **Hepatic Abscess. An Autopsy Study of 162 Cases.** *Indian J. Med. Sci.* 1955, Jan., v. 9, No. 1, 1–9, 1 fig. [11 refs.]

"1. The paper is an autopsy study of 162 cases of hepatic abscess met with in the autopsy room of King Edward VII Memorial Hospital, Bombay, in a 28 year period.

"2. Classified according to their etiologic basis these abscesses were amebic 105, pyemic 27, cholangitic 15, helminthic 2 and unclassified 13.

"3. The morbid anatomic and clinical features of each group of cases are discussed."

Calero M., C. Congestión y absceso hepático amebianos. [**Congestion and Amoebic Abscess of the Liver**] *Archivos Med. Panameños.* 1954, July–Aug.–Sept., v. 3, No. 3, 182–7, 7 figs. [11 refs.]

The author, from Panama, refers to a previous paper in which he dealt with the treatment of intestinal amoebiasis with aureomycin [this *Bulletin*, 1952, v. 49, 49] and now discusses a total of 66 patients having amoebic colitis with and without symptoms, of whom 11 suffered from hepatitis with congestion, and only 2 from amoebic abscess of the liver.

The clinical features are discussed in general with special reference to the liver signs and to radiological diagnosis: 7 skiagrams are shown. The differential diagnosis is considered. Chloroquine was effective in treatment and there were no deaths. *H. J. O'D. Burke-Gaffney*

Barrios, H. **The Treatment of Amebiasis with PAA-701—a Preliminary Report.** *Gastroenterology.* 1954, July, v. 27, No. 1, 81–6.

In the unhygienic, hot and humid area of the upper reaches of the Amazon in Peru amoebiasis is very prevalent. There is need for a drug which is useful not only for acute amoebic dysentery but for the sterilization of asymptomatic carriers of the infection. PAA-701, or diallyl-diethylaminoethyl phenol dihydrochloride, is a synthetically prepared basic bisphenol which is said not only to show amoebicidal activity *in vitro* in dilutions to 1 in 50,000 but to be active against the amoebae in man and in experimental animals.

Twenty adults with acute amoebic dysentery were treated in hospital at Iquitos with PAA-701. It was given orally in tablets; the dosage was 0·5 gm. thrice daily until the stools were negative and ulceration, seen sigmoidoscopically, disappeared. Of the 20 patients 4 who were more acutely ill than the others were given 0·5 gm. four times daily. The details are set out in a table; from this it seems that acute symptoms usually subsided by the third day of treatment; parasites vanished from the stools in 3–22 days, with an average of 7; and ulceration disappeared in 5–25 days, with an average of 10. The gross dosage for individual patients therefore ranged from 7·5 gm. to 56 gm. of the drug, with an average of 17 gm. There were no significant toxic side-effects of the treatment; it is claimed that all the patients were " clear of infection " on subsequent observation for periods ranging from one month to 7 months PAA-701 is therefore the drug of choice in the treatment of amoebiasis.

[There is no information on the methods of examination of the stools, or on the frequency of the stool examinations during and after the treatment.]

A. R. D. Adams

Black, R. L., Terry, L. L. & Spicknall, C. G. **Fumagillin in the Treatment of Amebiasis.** *Gastroenterology.* 1954, July, v. 27, No. 1, 87–92.

During the last 18 months the authors have treated 30 patients suffering from amoebiasis (17 asymptomatic) with Fumagillin. The patients were native Americans and foreign seamen. The dosage given each was 10 mgm. thrice daily for 14 days, a total of 420 mgm. All the patients were under close observation; their stools were searched by various methods every 4 days, and particular attention was paid to haematopoiesis and liver and renal efficiencies, as work on animals suggested that Fumagillin might affect these.

All of the 17 asymptomatic patients were stool-negative after treatment. Eleven of the 13 symptomatic patients were stool negative after treatment, but parasites reappeared in the stools of 2 of these 11 within a month. The remaining 2 of the 13 symptomatic patients had amoebic liver infections; as Fumagillin treatment alone failed to control their condition other treatment had to be given and so they are excluded from the assessment.

The special tests showed that Fumagillin has an adverse effect on liver function, and that it possibly has an adverse effect on renal tubule function in some patients; but there is no clear evidence of interference with haematopoietic function. All the toxic side-effects were mild and reversible.

A. R. D. Adams

Hernandez de la Portilla, R., Becerra, E. & Ruiloba, J. **Amebicidal Effects of Fumagillin** *in vivo*; **Preliminary Communication.** *Gastroenterology.* 1954, July, v. 27, No. 1, 93–7.

Seven patients with ulceration of the rectosigmoid from which vegetative *Entamoeba histolytica* could be obtained, one patient with perianal cutaneous amoebiasis, and a patient passing *E. histolytica* cysts, all of whom had previously repeatedly been treated with other drugs for their amoebiasis, were given Fumagillin. The drug was given alone; the dosage varied from 50 mgm. daily to 200 mgm. daily for periods ranging from 9 to 14 days. The side-effects were anorexia and insomnia in 2 patients, and urticaria with desquamation of the hands in 3 others. All the 9 patients were " cured "; but during subsequent observation periods of 1 to 9 months

it seems that one developed dysentery, and cysts reappeared in the stools of another. It is stated that reinfection could have accounted for these two. *A. R. D. Adams*

Allegra, G. & Niutta, R. Modificazione della flora di associazione dell' *Entamoeba histolytica* dopo trattamento con fumagillina. [**Modification of the Flora associated with** *E. histolytica* **after Treatment with Fumagillin**] *Riv. Istituto Sieroterap. Ital.* 1954, Nov.–Dec., v. 29, Nos. 6, 514–19. [33 refs.]

The English summary appended to the paper is as follows:—

"The behaviour of associated bacterial flora after treatment with fumagillin has been studied in 19 patients affected by amebic colitis.

"One strain of *Escherichia coli* (the 8th according to Kauffmann), all strains of *Proteus morganii* and a single one of *Shigella flexneri* were sensitive to antibiotic treatment, while the other strains of *Escherichia coli* (1st, 2nd, 7th and 9th) and *Shigella dysenteriae* were resistant."

Singh, I. **The Treatment of Chronic Amoebic Dysentery with Antibiotics in Combination with other Drugs.** *Lancet.* 1955, Mar. 12, 527–8.

The author observes that chronic amoebic dysentery responds only to a combination of drugs and it may even be necessary to give repeated treatments.

It is stated that the U.S. Army plan consisted of a preliminary course of penicillin and succinyl-sulphathiazole to eliminate secondary bacterial infection from the bowel, followed by emetine (injections) daily for 4–6 days. Subsequently emetine bismuth iodide was given for 12 consecutive days. During this time treatment was supplemented by a daily retention enema of chiniofon sodium. During the succeeding 12 days Diodoquin or carbarsone was given. The patient was confined to bed and if necessary a second course was given after an interval of 10–12 days. The author states that later British workers omitted the enemata and after the preliminary course as above gave emetine for 2 days followed by emetine bismuth iodide for 10 days and carbarsone for 8. Diodoquin was given to the patient throughout. He considers the results from this line of treatment to have been good. In 103 cases treated by him during 7 years the immediate cures were 81·5 per cent. and after 3–6 months' follow-up 60 per cent. A patient who did not respond to two courses failed to do so to a third. Furthermore, the author considers that treatment did not always eradicate amoebiasis because 17 of the 103 subsequently developed amoebic hepatitis 6 months to 5 years after treatment.

Since the introduction of other antibiotics the treatment has been replanned and an account is given of 32 patients with chronic amoebic dysentery of 3–12 years' duration: 13 had previously had the U.S. or British Army plan and 19 no standard treatment. Seven had associated hepatitis or hepatic abscess with palpable livers. All had diarrhoea, flatulence, indigestion, anaemia and avitaminosis.

The anaemia and avitaminosis were treated with loading doses of intravenous iron and vitamins. Antidysenteric treatment consisted of aureomycin 500 mgm., carbarsone 0·25 gm., Diodoquin 0·6 gm., and chloroquine 0·2 gm., given at 6 a.m., 2 p.m. and 10 p.m. for 6 days, followed by Diodoquin and chloroquine for 14 days. If any residual symptoms and signs remained after 6 weeks, irrespective of a negative stool, a second course

was given, consisting of oxytetracycline 500 mgm., carbarsone 0·25 gm. mepacrine 100 mgm. for 6 days at the same intervals. All patients were followed up for at least 3 months. Stools were examined on 3 consecutive days at the end of the first and second months and on 7 consecutive days at the end of the third month. Sigmoidoscopy was performed on all but 3.

There was progressive clinical improvement in 23 cases. Diarrhoea, abdominal tenderness, indigestion and hepatomegaly subsided before the end of treatment or soon after. Diarrhoea after completion of treatment in 4 patients was attributed to the drugs, probably aureomycin. In 5, as tenderness and thickening over the caecum and descending colon had not disappeared, the second treatment régime was repeated with satisfactory results. All stools were negative at the end of the first month and thereafter during the follow-up: at the end of 3 months occult blood tests were negative and all visible ulcers had healed, as ascertained by sigmoidoscopy. Subsequent follow-up of 20 patients for 8 months to 2 years " showed that the cure was permanent ". *Philip Manson-Bahr*

Faiguenbaum, J. & Alba, M. Ensayo terapéutico de la amibiasis con puromicina. [**Therapeutic Trial of Amoebiasis with Puromycin**] *Bol. Chileno de Parasit.* 1954, Oct.–Dec., v. 9, No. 4, 94–9.

The English summary appended to the paper is as follows:—

" The authors study the effect of Puromycin in 60 patients with diarrheal chronic amebiasis. In the treatment of a group of 10 patients the dosage was of 25 milligrams per kilogram of weight and day, while the remaining 50 patients received 12·5 milligrams per kilogram of weight and day; in all patients the drug was given during 3 days.

" The greater doses produced untoward effects, *i.e.*, nausea, asthenia, headache and diarrhea. The lower doses were better tolerated.

" Serial parasitic controls (6 stool examinations in every patient and in each control) were performed every 3 months, during one year. 98% of the patients were negative in the first parasitic control; in the second control, realized one year after the end of the treatment, the percentage was of 75%.

" In concern to the epidemiology, the authors point out the importance of the food handlers in the transmission of amebiasis, in addition to the other ambiental factors."

Sawada, T. & Hara, K. **Studies on the Production of Amebic Liver Abscess. (I) Experimental Production of Liver Abscess in Cats.** *Gunma J. Med. Sci.* Maebashi. 1954, Sept., v. 3, No. 3, 169–79, 3 figs. [19 refs.]

" 1) Amebic abscesses were produced by the inoculation of *E. histolytica* with associated bacteria.

" 2) By the inoculation with ameba, sterilized with antibiotics, amebic abscess, in which *E. histolytica* was not detected, was produced in 2 of 3 cats.

" 3) Well developed abscesses were established in the liver of cats damaged by the administration of alcohol and iodoform before the inoculation of *E. histolytica* without bacteria.

" 4) Histopathologic findings in the amebic abscess were related.

" a) In the amebic lesion, hemorrhage was found in all cases except the lesion produced by bacteria.

" b) The discrimination between amebic and bacterial abscess could not be decided by the presence of fibroblastic proliferation (abscess membrane)."

SAWADA, T. & HARA, K. **Studies on the Production of Amebic Liver Abscess. (II) Experimental Production of Liver Abscess in Rabbits and Dogs.** *Gunma J. Med. Sci.* Maebashi. 1954, Sept., v. 3, No. 3, 181–93, 1 fig. [27 refs.]

" 1) By the inoculation of amebae with associated bacteria into mesenteric vein and directly into liver, amebic abscess was produced in rabbit and dog.

" 2) Damage of liver or its decreased function play an important role in the establishment of amebic abscess in the liver.

" 3) Histologic findings in both animals were similar to that of cat stated in the former report."

HAEDICKE, T. A. & JONES, B. **Response of *Trichomonas hominis* to Carbarsone: a Case Report from Korea.** *Texas Reports on Biol. & Med.* 1954, v. 12, No. 4, 975–8.

" A case of Trichomonas hominis from Korea is reported. It is felt that the Trichomonas hominis organisms produced the changes in the intestinal mucosa and diarrhea in this case. Hexylresorcinol as well as aureomycin and chloroquine were found to be ineffective in the therapy of this case. A therapeutic response was attained with carbarsone. It is recognized, however, that this response could have been purely coincidental."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

BURGDORFER, W. **On the " Occult " Infection in Relapsing Fevers.** *Bull. Soc. Path. Exot.* 1954, v. 47, No. 5, 664–7.

The author carried out experiments with 4 strains of spirochaetes belonging to the *crocidurae* group, including *Spirochaeta crocidurae*, strain CO II, *S. merionesi*, strain SO VI; and *S. microti*, strain Mo. XIX, all isolated by Baltazard; and Egyptian spirochaetes, strain 1663 recovered from *Ornithodorus erraticus* by Hoogstraal. All 3 strains were maintained in their natural vector *O. erraticus* until required, when the ticks were fed on white mice. When these showed spirochaetes in the blood, adult guinea-pigs were inoculated from them and examined daily both microscopically in thick smears, and by subinoculation into white mice, for a period of 30 days. The results indicate that spirochaetes of this group do not produce " inapparent infections " in adult guineapigs. The organisms are so rare that they may be easily overlooked, but prolonged examination of thick-drop preparations revealed spirochaetes in small numbers whenever blood transfers to mice were positive. The organisms found in guineapig blood preparations were morphologically identical with typical spirochaetes.

Edward Hindle

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Hanks, J. H. & Gray, C. T. **The Application of Metabolic Studies to Leprosy Research.** *Internat. J. Leprosy.* New Orleans. 1954, Apr.–June, v. 22, No. 2, 147–61. [25 refs.]

As both human and murine leprosy bacilli have failed to be cultivated *in vitro* it has become necessary to study these organisms in other ways, and the method here adopted is the study of their basal or endogenous metabolism. A continuous transfer of energy is essential to life, and this implies the burning of substrate hydrogen as a fuel and the generation of high-energy phosphate bonds. The former of these is the easier to estimate, and was therefore used in the experiments. Mycobacteria, like other strict aerobes, "derives energy by a final transfer of metabolized hydrogen through the respiratory (cytochrome, heme-containing) system and by burning it with oxygen to form water". The rate of oxygen consumption, as determined by the Warburg respirometer, indicates therefore the rate at which hydrogen is being removed. In an oxygen-free environment colourless hydrogen acceptors (tetrazolium compounds) are changed by hydrogen to brilliantly coloured, water-insoluble pigments, making it possible to measure the rate of hydrogen transfer capacity. "As a result of this study, it has become evident that the intracellular trend among the pathogenic mycobacteria is to be explained by increasing limitations in oxidative capacity."

It has been possible to show by these studies that *Myco. leprae murium* possesses endogenous metabolic processes typical of those in cultivable mycobacterial pathogens. It is also clear that this organism is not equipped for extracellular survival or growth within susceptible hosts. Since survival of the bacilli *in vitro* is dependent upon the cell, further biological studies on cultivation should be directed toward the maintenance of cell cultures in solutions which are not fatal to the bacilli. It is suggested that "aside from immunological mechanisms (unstudied), two general types of antibacterial action seem capable of limiting pathogenesis: (*a*) interference with the utilization of external sources of energy by means of certain chemotherapeutic agents which are effective within cells, and (*b*) the more drastic action of anaerobiosis and of extracellular inhibitors". It is considered that the most significant result of these investigations is that they have shown that useful biological information can be obtained from non-cultivated mycobacteria by biochemical methods. *Ernest Muir*

Hanks, J. H. **Influence of Physical and Chemical Factors on the Hydrogen Transfer Capacity of Murine Leprosy Bacilli.** *Internat. J. Leprosy.* New Orleans. 1954, Apr.–June, v. 22, No. 2, 162–73, 3 figs.

This is a continuation of a previous paper [above]. For these studies *Myco. leprae murium* was used because like *Myco. leprae* it is not cultivable, but unlike it there is the possibility of measuring the infectiousness of suspensions of the organism. Cultivable mycobacteria were also used for comparison. Measurement of hydrogen transfer capacity (HTC) was used as it permits comprehensive study of many variables with modest numbers of bacilli. It has been found that conditions with respect to *p*H, oxygen,

carbon dioxide and electrolytes required for optimal conduct of endogenous metabolism coincide with those for cultivable mycobacteria. Serum is extremely toxic for the murine leprosy bacillus.

Washed, standardized suspensions of bacilli were obtained from testicular lepromas in rats. Tetrazolium violet is the only tetrazolium compound which has been found to accept sufficient amounts of hydrogen from *Myco. leprae murium* during 24 hours of anaerobic colour development. The amount of formazan (reduced tetrazolium) extractable in 100 per cent. acetone after 3 or 5 days' anaerobic incubation was regarded as a measure of HTC. It was found that the HTC was lost rapidly, but this was not regarded as corresponding to loss of viability, as glucose and other small molecular nutrients used by other forms of life did not modify either the HTC or infectiousness. Optimal conditions for sustaining HTC during aerobic incubation resemble those of other mycobacteria. This organism, like other mycobacteria, shows under anaerobic conditions enhancement of HTC and impairment of oxygen consumption, indicating damage of the respiratory system. *Myco. leprae murium* differs from cultivable pathogenic mycobacteria in its inability to use substrate *in vitro*, and in its great susceptibility to natural inhibitors in serum. Tissue homogenates inhibit the metabolic activity of *Myco. leprae murium*, and the organisms recovered from lesions differ in their metabolic activity on this account; but purified serum albumin improves both metabolism and infectiousness.

The conclusion is that there is evidence that metabolic activity, properly measured, affords an index of the infectiousness of murine leprosy bacilli after a period of incubation *in vitro*. *Ernest Muir*

Lowe, J. **The Leprosy Bacillus and the Host Reaction to it.** *Leprosy Review*. 1955, Jan., v. 26, No. 1, 15–24. [36 refs.]

The author first describes the methods of obtaining leprosy bacilli from leproma and of extracting the fractions: 3 protein fractions, 1 polysaccharide, and glyceride and phosphatide fractions, waxes and the final residue. These fractions resemble, and are in similar proportions to, the fractions of tubercle bacilli.

The lepromin test is next described with its early and late phenomena, the early being increased and the late diminished in proportion as the bacilli are ground up in preparing the antigen. In fact none of the fractions alone produces the late lepromin reaction, but only the whole bacilli. The early reaction (24–48 hours) is considered to be similar to that in the tuberculin test, but "the late Mitsuda reaction has no parallel in skin testing in tuberculosis; the only parallel is in histopathology". In this respect the bacillus of leprosy resembles that of tuberculosis, and it is possible by repeated injections of the protein fractions of the leprosy bacillus to desensitize to the early reaction, and yet this leaves the late one unchanged. Fernandez is quoted as regarding the early phenomenon "as indicating sensitivity to protein, and the late reaction as indicating resistance to the leprosy bacillus".

Next are described various complement-fixation, precipitin and agglutination tests, which give "evidence that in lepromatous leprosy there are circulating antibodies to a component of the tubercle bacillus". But in proportion as these tests are positive the lepromin test is negative. Recent evidence is quoted to show that "in a person who is tuberculin positive, the tissues can react to the leprosy bacillus by tubercle formation (for that is what a positive late lepromin reaction means) and this is a more definite indication of immunity than mere protein sensitivity".

In the following discussion the author contrasts leprosy and tuberculosis. In leprosy most cases belong to 2 distinct types with " sensitization and immunity on the one hand, and complete lack of these on the other ". In tuberculosis by contrast there is " an interplay of findings, some indicating the invasive powers of the infection, and some indicating sensitization and resistance of the host tissues ". While in the lepromatous type of leprosy there are abundant circulating antibodies in the blood, no sensitization and no cellular antibodies are revealed by the lepromin test. In the tuberculoid type, conversely, there are comparatively few bacilli, but these show intense cellular reaction; also antibodies circulating in the blood are shown to be few by the various tests. " There is some factor or group of factors operating in the tuberculoid case which is absent or inactivated in the lepromatous case, and this absence renders the patient susceptible and the disease progressive." In his closing remarks the author suggests the importance of cooperation in leprosy and tuberculosis research. *Ernest Muir*

Portnoy, J. & Edmundson, W. F. **A Simple Procedure for the Identification of Nonsyphilitic Reactions in Serologic Tests for Syphilis in Leprosy Patients.** *Internat. J. Leprosy.* New Orleans. 1954, Apr.–June, v. 22, No. 2, 181–94. [32 refs.]

In the U.S.A. the nation-wide campaign against venereal disease has considerably diminished the amount of clinical syphilis, but this has resulted in an apparent increase in the number of non-syphilitic reactors to serological tests for syphilis (STS). Various attempts have been made to improve specificity by purification of the antigen and by differential procedures. The TPI test or other tests associated with *T. pallidum* may be used in future if technical difficulties can be overcome, but at present it is desirable to improve further the STS. The authors have been testing a technique with the use of a choline chloride solution for the differentiation of syphilitic and non-syphilitic reactions in sera from leprosy patients. This technique is described in full and a comparison is made in 142 non-leprous syphilitic patients and in 255 leprosy sera. With antigen suspensions containing choline chloride, sera of syphilitic patients with or without leprosy showed an augmentation of sero-reactivity; non-syphilitic reactive leprosy sera showed a diminution of sero-reactivity. This differential procedure compared favourably with the TPI test in normal persons and in syphilitic non-leprous patients, as well as in leprosy patients with or without clinical or historical evidence of syphilis. *Ernest Muir*

Gehr, E. Zur Kasuistik der Lepra. [**Observations on Cases of Leprosy**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Nov., v. 5, No. 4, 492–7, 9 figs.

Nine cases are described which the author considers unusual. In the first, what seemed to be a lepromatous case became under treatment tuberculoid with a positive lepromin reaction. [This case, from the description, may have been of the border-line type.] The second was a 14-months-old child with a leproma on the cheek. The other 7 patients showed tuberculoid reaction, alopecia and other conditions, which are well illustrated with photographs. *Ernest Muir*

Lowe, J. **Leprous Affection of the Eyes.** *Proc. Roy. Soc. Med.* 1955, Feb., v. 48, No. 2, 107–8 (Sect. Ophthalm. 1–2).

The author points out that lepromatous infiltration of the eye is part of the generalized systemic infection, is the most serious of the leprous eye infections and even in mild cases a degree of lepromatous infiltration of the eye is common although it often does not produce any marked symptom. He also points out the great regional variations in the severity of leprous eye lesions. In Chinese, Anglo-Indian, South American and European patients, severe leprous eye infections seem to be relatively common, in contrast to patients in the plains of India and in West Africa in whom eye infections are less common. Finally the author points out the value of chemotherapy in the prevention of serious eye lesions and in his own experience, working in Eastern Nigeria between the years 1947 and 1954, the marked fall in the incidence and severity of lepromatous eye lesions was very striking. The main measures in treatment are sulphones orally (DDS, if necessary in small doses) and cortisone given either as eye drops or as subconjunctival injections in the acute cases. If all cases could be promptly diagnosed and thoroughly treated, serious leprous eye lesions would also all be prevented. *E. W. O'G. Kirwan*

Mann, Ida. **Ophthalmic Impressions of a Leprosarium.** *Leprosy Review.* 1955, Jan., v. 26, No. 1, 10–14.

The author examined 273 patients at the Derby Leprosarium in Western Australia and found that 47 of these patients had ocular complications of leprosy. These consisted of 22 cases of leprotic keratitis, 21 of iritis and 4 of facial paralysis. In the active cases of keratitis and iritis the author recommends cortisone eye drops to decrease the oedema and exudative processes while the sulphones are dealing with the infecting organisms. In iritis cortisone should be combined with 1 per cent. atropine. The cases of trachoma—172 in number—were far more numerous than the cases of ocular leprosy, and an interesting fact was observed in the survey:—no case of active trachoma was found, and in view of the trachoma survey elsewhere it was obvious that chemotherapy with Sulphetrone and DDS used in the treatment of leprosy "had entirely killed the trachoma virus" and also cured any secondary septic infection. This finding was subsequently confirmed by a clinical experiment with DDS on a group of children with active trachoma but no leprosy. The cure, however, is not as rapid as with oral sulphadiazine or sulphadimidine combined with local aureomycin or oxytetracycline ointment.

No one was blind from leprosy alone, and sulphone treatment appeared to prevent any serious ocular complication. *E. W. O'G. Kirwan*

Waaler, E. **Leprosy and Cancer.** *Internat. J. Leprosy.* New Orleans. 1954, Apr.–June, v. 22, No. 2, 200–204, 4 figs. on pl. [16 refs.]

A case of basal-cell carcinoma occurring in an old leprous lesion is described. The literature of the two diseases occurring concurrently is discussed, 42 known cases being mentioned. The hypothesis put forward by certain Norwegian leprologists that leprosy gave some kind of protection against cancer is refuted. It may be that the more sheltered life in a leprosarium may lessen actinic and other possible carcinogenic influences. While former methods of treatment of lupus vulgaris may have been

carcinogenic, the same does not apply to leprosy treatment. The paper is illustrated with 4 photomicrographs showing the histological appearances of the combined lesion. *Ernest Muir*

Fernandez, J. M. M., Appel, B. & Dougherty, E. **Influence of Hydrocortisone, Cortisone and ACTH on the Lepromin Reaction.** *Internat. J. Leprosy.* New Orleans. 1954, Apr.–June, v. 22, No. 2, 129–38, 7 figs. on 2 pls. [15 refs.]

First, reports of other authors are given on the effect of hydrocortisone, cortisone and corticotrophin in temporarily inhibiting or diminishing sensitivity to tuberculin and other antigens. The authors, examining 21 healthy adults, only 6 of whom had had contact with leprosy patients, injected intradermally hydrocortisone simultaneously with lepromin on one side of the body, and, as controls, lepromin alone on the other side. Of 18 who reacted positively in the controls 14 showed total inhibition on the hydrocortisone side, as regards the early (Fernandez) reaction. The late (Mitsuda) reaction was present on the control side in 17, and on the hydrocortisone side it was negative in 14 of these 17, and partially inhibited in 3. In two cases in which a Mitsuda nodule was formed, infiltration of the nodule with hydrocortisone reduced it to a yellow-violaceous plaque within 48 hours.

Tests were also made with other antigens: tuberculin, Frei and Ducrey. In 10 persons with positive tuberculin tests there was total inhibition in 6 when hydrocortisone was injected locally, and partial in 2. In 5 positive with Frei, 4 were totally and 1 partially inhibited with hydrocortisone. In 8 positive to the Ducrey reaction there was total inhibition in 4 and partial in 2. The results are also given of a number of patients treated with cortisone and corticotrophin. In 14 patients suffering from various diseases due to hypersensitization, cortisone or corticotrophin caused inhibition of the early lepromin reaction in 9 and of the late in 4. *Ernest Muir*

Dharmendra & Sen, N. R. **Vitamin C in the Treatment of Reactions in Tuberculoid Leprosy.** *Bull. Calcutta School Trop. Med.* 1954, July, v. 2, No. 1, 16–17.

The authors, in the Calcutta School of Tropical Medicine, attempted to confirm the results of Floch and Sureau who treated 2 cases of reacting tuberculoid leprosy with vitamin C [this *Bulletin*, 1953, v 50, 35].

All of 8 patients were given intramuscular injections of 500 mgm. of vitamin C daily on 6 days a week for varying periods. The first two patients were treated for 8 and 10 weeks with total doses of 26 and 31 gm., respectively. As the improvement was only slight, slow and never complete, it was decided that in the other patients the treatment should be ended earlier if improvement was absent or slight after 1 to 3 weeks, and the more usual treatment (cutaneous calcium gluconate and antimony) given instead.

Three of the 6 patients were treated for less than 2 weeks, with very little improvement and one even developed fresh lesions. Two of those who continued to attend were then given the alternative treatment referred to above twice weekly. Appreciable improvement occurred at the end of the first week and progressed and after 8 weeks the acute activity had subsided completely.

The last 3 showed poor results in the first 2 weeks, but the vitamin C treatment was continued for 3 weeks and then replaced by calcium and potassium antimonyl tartrate. Two of the patients improved thereafter and the acute activity had completely disappeared after 5 weeks: the third resisted even this treatment, and after 2 weeks of it was given corticotrophin, 20 mgm. daily for 5 days, which controlled the reaction.

The authors therefore found little benefit in the use of vitamin C in reacting tuberculoid leprosy: better results followed the usual and much less expensive calcium and potassium antimonyl tartrate.

H. J. O'D. Burke-Gaffney

Lippi, M. & Tucci, A. Ulteriori osservazioni sulla terapia della lepra con l'idrazide dell'acico isonicotinico. [**Further Observations on the Treatment of Leprosy with Isoniazid**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Nov., v. 35, No. 11, 567–606. [18 refs.] English summary.

After surveying the previous publications on this subject the authors describe their treatment in Yemen of 27 leprosy patients with the hydrazide of isonicotinic acid [isoniazid] and with the calcium methane sulphonate of isonicotinic acid hydrazide [Neo-tibazide]. The length of treatment varied from 77 to 365 days. All the patients improved clinically, and the bacteriological examination became negative in 23 cases. The treatment was well tolerated. Of the patients 16 are described as being of the *nervosa* [?neural] type, and the rest as mixed. Bacteriological examination was of smears from the nasal mucosa and inguinal gland punctures, none of the former and 14 of the latter being positive on the 20th day of treatment. [The nomenclature used and the method of bacteriological examination make it difficult to estimate accurately the degree of improvement under treatment.] Full clinical notes are given. *Ernest Muir*

Dharmendra & Chatterjee, K. R. **Cepharanthin in the Treatment of Leprosy.** *Leprosy in India.* 1954, Oct., v. 26, No. 4, 157–9.

Cepharanthine is an alkaloid derived from 2 species of *Stephania* of the Menispermaceae family. Good results in the treatment of leprosy were reported by Japanese workers [this *Bulletin*, 1951, v. 48, 566] after 7 years' trial on 444 patients. Sato [this *Bulletin*, 1952, v. 49, 1050], another Japanese worker, reported unfavourably. The authors, after a trial for 41 weeks on 7 lepromatous cases, and for 52 weeks on 8 tuberculoid cases, were not able to confirm the results claimed by the early Japanese workers, though there was definite improvement in 3 patients.

Ernest Muir

Kanakaraj, J. D. **Surgical Trends in Leprosy.** *Leprosy in India.* 1954, Oct., v. 26, No. 4, 160–63, 18 figs. on 3 pls. [Reprinted from *Antiseptic.* 1954, Apr.]

Nishimura, S. & Kono, M. **Studies on Serum Protein Components of Murine Leprosy.** *Med. J. Osaka Univ.* 1954, Dec., v. 5, No. 4, 645–51.

"1. The serum protein components were examined by electrophoresis in normal white rats and those infected with murine leprosy. The infected rats were divided into three groups, inapparent, light and severe.

"2. No significant difference was found in the albumin and globulin values between the normal controls and the infected groups.

"3. There was no relationship between the size of the leproma and the gamma globulin amount.

"4. The small differences in values noted between the groups were studied statistically following a set formula but it was determined that the difference observed in tables 1 and 4 was not significant statistically.

"5. It was found that murine leprosy differs from human in that the serum gamma globulin does not increase.

"6. The fact that there is little change in serum gamma globulin in murine leprosy together with the fact that the inflammatory reaction is light even though a large number of bacteria are present in the lesion affords material of interest in discussing the mechanism of increase in gamma globulin in nodular leprosy. This fact, together with our findings that gamma globulin is not increased in murine leprosy, affords an important suggestion in discussing the above theories of gamma globulin production."

Chaussinand, R., Viette, M. & Krug, O. Nouvelles observations sur l'action de l'hydrazide de l'acide isonicotinique (INH) dans l'infection murine à bacille de Stefansky. [**New Observations on the Action of Isoniazid in Rats infected with Stefansky's Bacillus**] *Ann. Inst. Pasteur.* 1955, Mar., v. 88, No. 3, 378–81.

The following is a translation of the author's summary:—

Stefansky's bacillus acquires a resistance to isoniazid in rats treated with this product. In animals inoculated with strains resistant to isoniazid, treatment is almost without effect. Treatment with isoniazid carried out 17 days after inoculation is more effective than when it is begun immediately. On the other hand, the lesions seem to be less marked when the animals are treated during periods of 3 months, separated by intervals of one month's rest.

Subcutaneous treatment, which is better tolerated by rats than oral administration, makes it possible to give up to 50 mgm./kgm. daily. Nevertheless, even at this dose, isoniazid does not seem to suppress the infection. [See also this *Bulletin*, 1953, v. 50, 523; 1954, v. 51, 67.]

H. J. O'D. Burke-Gaffney

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Maldonado, J. F., Acosta-Matienzo, Josefina & Vélez-Herrera, F. **Comparative Value of Fecal Examination Procedures in the Diagnosis of Helminth Infections.** *Exper. Parasit.* New York. 1954, Sept., v. 3, No. 5, 403–16. [12 refs.]

The investigation was undertaken to judge the reliability and sensitivity of different methods in the definitive diagnosis of schistosomiasis and other helminthic infections, as well as their simplicity and the rapidity of their execution. Stool samples were taken from two groups of 250 persons and each sample examined by 4 or 5 different methods (three methods were used on both batches but for the second batch one—the glycerin method—

was dropped and 2 others added). The methods used were: the direct saline smear (three 22 cmm. smears); sedimentation by gravity in 0·5 per cent. glycerinated water; and 4 centrifugalization methods, HCl-triton-ether, sodium-sulphate-triton-ether, HCl-sodium-sulphate-triton-ether, formalin-triton-ether centrifugation.

The percentage infection with various worms among the 500 persons was *Schistosoma mansoni*—35·4, *Trichuris trichiura*—93·8, *Ascaris lumbricoides*, fertile—22·0, infertile—10·4, hookworm—50·0, *Strongyloides stercoralis*—10·2.

The percentage of the total number of persons with each worm infection diagnosed by each method was at follows:—

	Infections					
	S. mansoni	*T. trichiura*	*A. lumbricoides*		Hookworm	*S. stercoralis*
			F.	*Inf.*		
3 direct smears	47	86	94	98	62	90
glycerinated water	85	94	97	100	74	56
HCl-triton-ether	80	99	86	8	97	6
Sod-sulph-triton-ether	91	99	89	25	60	63
HCl-sod-sulph-triton-ether	76	99	68	37	92	19
Formalin-triton-ether	91	99	95	79	94	54

For the diagnosis of *S. mansoni* infections formalin-triton-ether and sodium-sulphate-triton-ether proved the most effective methods; for hookworm, hydrochloric-acid-triton-ether and formalin-triton-ether proved most effective; for *S. stercoralis*, the direct smear was outstandingly the best method; for *A. lumbricoides*, all concentration methods gave poor results and the direct smears and glycerinated water gave the best results; for *T. trichiura* all methods gave good results; and for *S. stercoralis* all methods except direct smears gave poor results.

The investigation emphasized the all-round importance of the simple smear method and the value of formalin-triton-ether among the concentration methods. *L. E. Napier*

Schwetz, J., Baumann, H. & Fort, M. "Sur les schistosomes actuellement (en 1953) connus en Afrique". (Note complémentaire.) [**The Schistosomes known at Present in Africa**] *Ann. Soc. Belge de Méd. Trop.* 1954, Aug. 31, v. 34, No. 4, 495–8, 3 figs. on 2 pls.

The authors' summary in French is freely translated as follows:

To complete the review [this *Bulletin*, 1954, v. 51, 809] which they made of the species of schistosomes of Africa, the authors record various species of doubtful identity or very rarely met with. They enlarge upon a parasite of the African elephant, for which a new genus, *Bivitellobilharzia loxodontae* was created [in 1940 by Vögel and Minning].

J. J. C. Buckley

Maroja, R. C. Incidência de esquistossomose em Fordlândia, município de Itaituba, Estado do Pará. [**Incidence of Schistosomiasis in Fordlandia, Pará**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1953, June, v. 6, No. 1, 211–18. [10 refs.]

The English summary appended to the paper is as follows:—

"(1) The author verified the existence of autochthonous cases of Schistosomiasis in the State of Pará, these constituting the first ones found in the Brazilian Amazon region.

" (2) It is probable that distribution of the parasitic infection is not confined to Fordlândia, as suggested by the case of the patient from Brasília Legal.

" (3) Schistosomiasis was probably introduced into Fordlândia by persons from the Northeast, carriers of the parasitic infection, brought in to work on the extraction of rubber latex.

" (4) Measures should be taken in Fordlândia to eradicate the parasitic infection, both by control of intermediary hosts and treatment of patients.

" (5) It is necessary to extend control to planorbids existing in the Bragantina area of the State of Pará.

" (6) Obligatory stool tests by the enriching method are an obvious necessity for all migrants from endemic zones to the Amazon region."

Lichtenberg, F. & Lindenberg, M. **An Alcohol-Acid-Fast Substance in Eggs of** *Schistosoma mansoni*. *Amer. J. Trop. Med. & Hyg.* 1954, Nov., v. 3, No. 6, 1066–76, 4 figs. [15 refs.]

Having noted that the eggs of *Schistosoma mansoni* contained an alcohol-acid-fast substance, the authors developed a method, involving the use of a modified Ziehl-Neelsen technique, for the specific staining of the eggs in sections of the tissues and in the faeces. " In tissue sections it was found that eggs and fragments of eggs were stained to the exclusion of any other element, save for acid-fast bacteria. Whole eggs were identified with ease and, in addition, empty shells and fragments of shells engulfed in giant cells and buried in tissue scars were visualized where one could not see them with hematoxylin-eosin. Besides positive staining, the shape of these fragments, their degree of refringence, and the surrounding tissue reaction were found to be sufficient criteria for diagnosis." In smears made from faeces suspected to contain the ova, the results obtained were not so conclusive, since certain vegetable remnants and other particles also retained the stain, but the authors consider that in practice these remnants are not likely to be confused with schistosome eggs. When this staining technique was introduced as a routine method of stool examination in two institutions in Bahia, Brazil, it was found greatly to increase the percentage of positives recorded from the laboratories.

The authors found that two varieties of the acid-fast material were present in the egg, one in the capsule and one in the miracidium. The first of these substances stains constantly and was shown to be resistant to drastic chemical treatment and to persist in old lesions within the tissues even after the egg had become fragmented. On the other hand, the acid-fast material present in the miracidium stained only when the capsule was intact, so that decoloration of the miracidium occurred almost immediately after the egg had been punctured with a fine needle. [The original paper should be consulted for details of the techniques employed and the results obtained by their use.] *R. M. Gordon*

Henion, W. F., Mansour, T. E. & Bueding, E. **The Immunological Specificity of Lactic Dehydrogenase of** *Schistosoma mansoni*. *Exper. Parasit.* New York. 1955, Jan., v. 4, No. 1, 40–44, 1 fig.

" An antiserum against lactic dehydrogenase of *Schistosoma mansoni* markedly inhibited the activity of this enzyme as well as those of the enzymes catalyzing the same reaction in *Schistosoma japonicum* and in *Schistosoma haematobium*. The same immune serum had no effect on the

activities of lactic dehydrogenase of rabbit muscle and on those of another glycolytic enzyme of *Schistosoma mansoni*, phosphohexose isomerase. Reduced diphosphopyridine nucleotide, one of the substrates of lactic dehydrogenase, protected the schistosome enzymes from the inhibitory effect of the antiserum."

MOZLEY, A., **An Introduction to Molluscan Ecology. Distribution and Population Studies of Fresh-Water Molluscs.**

This book was reviewed on p. 417.

PINTO, D. B. & DESLANDES, N. Contribuição ao estudo da sistemática de planorbídeos brasileiros. [**A Contribution to the Study of the Brazilian Planorbidae**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1953, June, v. 6, No. 1, 135–67, 19 pls. [15 refs.]

The English summary appended to the paper is as follows:—

"The authors present some observations on the external and internal anatomy of snails originated from different regions of the country.

"The snails studied were separated in 5 (five) distinct groups, according to the characteristics of their genitalia and kidneys, a comparison being established between the species of each group and descriptions, illustrations and photographs found in the specialized literature.

"Snails in number of 695 captured in 53 localities were dissected and studied.

"The conclusions were the following:

" Genus:

Groups I, II, III, IV and V—Australorbis Pilsbry, 1934.

" Species:

Group I—*Australorbis glabratus* (Say, 1818)
Group II—*Australorbis nigricans* (Spix, 1827)
Group III—*Australorbis centimetralis* (Lutz, 1918)
Group IV—*Australorbis nigrilabris* (Lutz, 1918)
Group V—*Australorbis* sp."

BIBAWI, E., MAHFOUZ, M. M. & MASSOUDA, B. **The Spleen-Carotid Time and its Evaluation in Bilharzial Hepatic Fibrosis.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 10, 1185–92.

Lobeline was first used for the determination of the systemic circulation time by TEPLOV and SOR [*Terepevticeski Archiv.*, 1935, v. 57, 113]; lobeline stimulates the respiratory centre by its action on the chemoreceptors of the carotid body. When this drug is injected directly into the spleen sinusoids it normally passes *via* the splenic vein through the portal vein and liver to the caval system; on reaching the carotid body it causes a short period of coughing and hyperpnoea, and sometimes a feeling of suffocation. The time elapsing between the injection and this reaction is the "spleen-carotid" time; in 20 normal persons it ranged from 9 to 13 seconds. When there is portal obstruction the lobeline injected into a splenic sinusoid may enter the systemic circulation through porto-caval shunts; the spleen-carotid time in such cases varies with the degree of portal obstruction and the amount of collateral circulation.

The spleen-carotid time was determined by this means in 40 cases of

schistosomal hepatic fibrosis. It was found to be normal in 24 of them (14 with ascites), reduced below 9 seconds in 9 (5 with ascites), and increased beyond 13 seconds in 7 (1 with ascites), so it was more commonly normal or reduced in those with than in those free from ascites. Percutaneous splenic venography showed that the collateral circulation was well developed in those patients with normal or reduced spleen-carotid times, and that this was provided by the short gastric, para-umbilical, and splenic capsular veins. Ether portal circulation times were also determined in these cases, but were found to bear no relationship to the spleen-carotid times; liver function tests were done, and the results of these bore no relationship to the sizes of the liver and spleen.

[Details of the technique of the lobeline test should be sought in the original.] *A. R. D. Adams*

See also p. 582, El Gazayerli & Khalil, **Observations on Diseases of the Appendix.**

Koppisch, E.; Rathmell, T. K. **Schistosomal Granuloma of Lung.** [Correspondence.] *Amer. J. Clin. Path.* 1954, Dec., v. 24, No. 12, 1409.

Discussing the article by Rathmell *et al.* [this *Bulletin*, 1954, v. 51, 957] on "Visceral Granulomas caused by Migrating Larvae of *Ascaris lumbricoides*", Koppisch points out that no *Ascaris* larvae are demonstrated in any of the illustrations to the article in question, that Figures 1 and 3, in which these larvae are supposed to be shown, include what seem to be "parasitic eggs" and that Figure 3 could very well represent a schistosomal pseudotubercle. Koppisch considers that these features, together with the cirrhosis of the liver, splenomegaly and ruptured oesophageal varices found in a Puerto Rican subject, leave little doubt that the eggs and pseudotubercle shown were schistosomal. He thinks that the area of coagulation necrosis shown by Rathmell *et al.* and said to have been found in a hilar lymph node could be tuberculous and that it is very doubtful whether it could have been caused by larvae of *A. lumbricoides*, even if an *Ascaris* pneumonitis had been present. Koppisch considers that the case was more probably one of schistosomiasis.

Rathmell, appreciating Koppisch's criticisms, states that, after submitting the original protocol and materials to the Armed Forces Institute of Pathology, he and his colleagues now believe that the lesion described in the perihilar lymph nodes was not tuberculous, but that the submucosal parasites in the gastro-intestinal tract were schistosomes, that the granulomata in the liver were also schistosomal and that the lung lesions were also most likely schistosomal. *G. Lapage*

King, B. A. **Treatment of Schistosomiasis with "Nilodin".** *Brit. Med. J.* 1955, Jan. 22, 185–8.

At the Brakpan Mines in the Transvaal Dr. King conducted an extensive trial with Nilodin (lucanthone hydrochloride) in urinary and rectal schistosomiasis. He selected for treatment only cases passing viable ova after treatment. "If only one viable ovum or miracidium was observed at any time after the first week following treatment, then that case was considered to have relapsed."

Urinary schistosomiasis

A total of 46 cases of infection with *S. haematobium* were divided into 2 series. The first series consisted of 24 patients who were followed up for at least 3 months. The dosage of Nilodin was 20 mgm. per kgm. body weight per day and was divided into 3 equal doses. The course lasted 12 days. Toxic manifestations included nausea and vomiting, abdominal pain and discomfort, and anorexia and nausea, but these were not severe and could be controlled with phenobarbitone, 1 grain twice a day. The clinical response was good and haematuria when frank usually stopped about the eighth day. In pyrexial cases the temperature responded by the sixth day. Five of the 24 cases relapsed within the three-month period and 2 more after this time. In this series the author achieved a 60 per cent. six-month " cure " but he admits that even after 6 months relapse may occur. The mean time of relapse was at the seventh week after treatment.

The second series comprised 22 patients receiving a more concentrated course of treatment over a shorter period—25 mgm. per kgm. body weight per day for 9 days. Of the 18 cases followed up for a six-month period 12 (67 per cent.) relapsed. This regarded in the best light showed a 33 per cent. " six-month cure ". The important fact emerging from this investigation is that with a nine-day course of treatment only a 33 per cent. " cure " can be expected. " In the light of claims that have been made of an 80% cure rate following a five-day course, this should serve as a warning against over-optimism." Such claims can only be attributed to an inadequate follow-up and the author suggests that a good method of follow-up would be a fortnightly re-examination for 6 months following treatment and thereafter a monthly examination for another 6 months.

Rectal schistosomiasis

The daily dosage of Nilodin aimed at was 20 mgm. per kgm. body weight. Three patients received a twelve-day course of treatment and a fourth only a six-day course. Of the 4 cases two relapsed on the criterion stated above. The clinical response was, however, excellent in all 4 cases.

The author concludes that there is little variation in the susceptibility of *S. haematobium* and *S. mansoni* to Nilodin when given in adequate dosage over a long enough period. Nilodin is easy to administer, it is relatively cheap, it cures a high percentage of cases, the clinical response to the treatment is exceptionally good and every patient benefits to some degree. Treatment should extend over a period of at least 12 days and preferably 16 days and the cases should be followed up for at least 6 months. His final conclusion is that Nilodin is a highly effective treatment of schistosomal infections for the non-European miners in South Africa, under the conditions stated. *M. Gelfand*

Dias, C. B., Borrotchin, M. & da Silva, J. R. Tratamento rápido da esquistossomose mansônica pelo tartarato de antimônio e sódio. [**Rapid Treatment of** *Schistosoma mansoni* **Infection with Sodium Antimony Tartrate**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1953, June, v. 6, No. 1, 199–210. [18 refs.]

The English summary appended to the paper is as follows:—

" The authors arrived at favorable conclusions of results obtained with rapid treatment of 543 schistosomiasis mansoni patients by means of tartarate of antimony and sodium. No serious accident occurred in any case, although tolerability was more satisfactory with the one-day treatment schedule. Results of treatment could not be followed up for 310 patients

treated in Aimorés owing to difficulties in carrying out control tests. Percentage of cure or of negative result was 48·7% for 82 patients treated on the one-day schedule with 7·5 to 8·0 mg. per kilo of body weight, and 61·5% for 122 cases treated on the two-day schedule with 12 mg. For 20 cases treated on the one-day schedule in Rio de Janeiro, 70% negative results were obtained. This higher rate was probably due to lesser infestation of patients, removed from endemic zones of the parasitic infection. There was no improvement in tolerability or in therapeutic efficiency by the association of vitamin K to the antimonial."

Halawani, A. & Latif, N. **On the Toxicity of certain Halogenated Phenols, Catechols o-Benzoquinone and Benzodioxole Derivatives to** *Planorbis* **Snails.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 8, 957–62.

" 1) The molluscacidal activity of tetrachloro- and tetrabromo-catechol and tetrachloro and tetrabromo-o-benzoquinone was investigated.

" 2) Several halogenated benzodioxole derivatives were prepared, and their toxicity to Planorbis snails was tested.

" 3) The importance of the presence of the OH group in the above mentioned derivatives and the pH of the medium for the molluscacidal activity is stressed."

Nolan, M. O. & Bond, H. W. **Results of Laboratory Screening Tests of Chemical Compounds for Molluscicidal Activity. III. Derivatives of Abietic Acid.** *Amer. J. Trop. Med. & Hyg.* 1955, Jan., v. 4, No. 1, 152–5.

" Abietic acid and 14 related compounds were screened for activity against *Australorbis glabratus*. High activity at 10 ppm was found among abietylamines and among Rosin Amine D and its salts. Fourteen simpler amines were found to be devoid of activity at 10 ppm.

" The seat of activity in the abietic nucleus remains uncertain."

Schwetz, J., Fort, M. & Baumann, H. Double problème de l'infection bisexuée, d'un seul planorbe par des cercaires de *Schistosoma rodhaini* et hybridation de *S. rodhaini* et de *S. mansoni*. [**Dual Problem of Bisexual Infection from a Single Snail by Cercariae of** *Schistosoma rodhaini* **and of Hybridization of** *S. rodhaini* **and** *S. mansoni*] *C.R. Soc. Biol.* 1954, Aug.–Sept., v. 148, Nos. 15, 16, 17 & 18, 1507–9, 1 fig.

The authors' summary in French is freely translated as follows:

From our preliminary experiment, consisting of simultaneous infection of the same mice with cercariae of *S. rodhaini* from a single snail and with those of *S. mansoni* from another snail, it appears that the cercariae of *S. rodhaini* from a single snail can give rise to a normal bisexual infection. We have not observed in this experiment any signs of hybridization, which seems to us, moreover, to be improbable *à priori*. Further experiments are necessary and will be carried out to elucidate the two problems indicated in the title of this note. *J. J. C. Buckley*

Moore, D. V. **Sexual Anomalies in the Male *Schistosoma japonicum* (Formosan Strain).** *J. Parasitology.* 1955, Feb., v. 41, No. 1, 104–8, 3 figs. on pl.

The English summary appended to the paper is as follows:—

"Sexual anomalies, in the form of male hermaphrodites and the occurrence of supernumerary testes in male worms of *Schistosoma japonicum* (Formosan strain) are reported. An examination of many more worms of the Chinese and Japanese strains of *S. japonicum* revealed no such anomalies."

Nañagas, V. T., Pascual, A. A. & Canlas, M. S. *Fasciola hepatica* **in the Common Bile Duct. Report of a Case.** *J. Philippine Med. Ass.* 1954, Sept., v. 30, No. 9, 448–50.

Garduño, D. M. & Icasiano, C. B. **A Case of Human Cysticercosis (*T. solium*).** *J. Philippine Med. Ass.* 1954, Nov., v. 30, No. 11, 572–80, 2 figs.

The first case diagnosed in life in the Philippines.

Ahumada, M., Molina Pasquel, C. & Mazzotti, L. Tratamiento de las teniasis con Azacrin. [**Treatment of Taeniasis with Azacrin**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Sept., v. 14, No. 3, 119–21. English summary (3 lines).

The authors, from Mexico, refer to the use of the acridines in the treatment of taeniasis and the side-effects which might occur in some cases.

They then describe the use of Azacrin [this *Bulletin*, 1953, v. 50, 477; 1954, v. 51, 1224] in the treatment of 30 patients, 23 with *Taenia saginata* and 7 with *T. solium*. The patients were aged 5 to 54 years.

The patients received a light and easily digestible diet the day before treatment and a saline laxative that night, followed by an enema on rising next morning. Half an hour before the Azacrin was given, the patients received 0·1 gm. of phenobarbital (0·05 gm. for children under 10) to reduce nausea and vomiting.

The Azacrin tablets were each of 100 mgm. and 2 were given every 5 minutes, with 0·6 gm. of sodium bicarbonate, until the required dose was completed. This was determined according to age—children of 5 received a total dose of 200 mgm.: the dose was proportionately larger for adults, to whom a maximum total of 700 mgm. was given. Two hours later a purgative (sodium sulphate) was given.

The parasites were expelled in 26 of the 30 patients, who remained free for at least 3 months: in 15 cases the complete worm was expelled within 30 to 45 minutes, that is, before purgation.

Five patients suffered from mild vomiting and epigastric discomfort: in one vomiting was more severe. Another patient had some conjunctival irritation. but as he had previously shown this with mepacrine, it was presumably an allergic phenomenon.

The authors consider that Azacrin was as effective as mepacrine in the treatment of taeniasis, and rather less toxic. *H. J. O'D. Burke-Gaffney*

Neghme, A., Silva, R. & Rodríguez Z., L. Hidatidosis humana en Chile en 1953. [**Human Hydatid Disease in Chile in 1953**] *Bol. Chileno de Parasit.* 1954, Oct.–Dec., v. 9, No. 4, 110–12.

The English summary appended to the paper is as follows:—

"The authors have made a revision of the statistics of the hospitals of the National Public Health Service of Chile in 1953.

"In that year, 526 patients with hydatid cyst were hospitalized, 493 of them were new cases and the remaining 33 were re-hospitalized old cases. The morbidity rate per 100,000 inhabitants was 8·01. The mortality rate was 4·66 per cent (23 cases). 77 per cent of the cases belonged to the age-groups ranging between 11 and 50 years.

"The 526 patients with hydatid disease spent a total of 27,437 bed-days, with an average of 52·16 bed-days for each patient. The cost of hospitalization for patients with hydatid disease for 1953 is estimated in 27,500,000 Chilean pesos or about 250,000 U.S. dollars."

Barclay, S. **Cardiac Hydatid Cyst. Report of a Case.** *New Zealand Med. J.* 1954, Dec., v. 53, No. 298, 605–6, 3 figs. (2 on pl.).

Shammas, J. A. **Hydatid Disease of the Central Nervous System in Iraq.** *J. Faculty of Med., Baghdad, Iraq.* 1954, v. 18, Nos. 5/6, 63–79. [21 refs.]

Sadeh, J. [**Toxic Encephalitis with Positive Electro-Encephalogram due to Oil of Chenopodium.**] *Harefuah.* Jerusalem. 1955, Jan. 16, v. 48, No. 2. [In Hebrew 29–30. English summary 30.]

The English summary appended to the paper is as follows:—

"The case of a young girl who was treated for a heavy infestation with ankylostoma duodenale by oil of chenopodium is presented. Following treatment, severe neurological complications appeared: transient blindness, headaches and convulsions. An EEG taken at the height of the complication disclosed a grossly abnormal pattern which gradually reverted to normal with clinical recovery.

"It is concluded from a review of the methods of treating ankylostomiasis and from the experience gained in this case, that supportive therapy and safer anthelminthic, such as hexylresorcinol and tetrachlorethylene should be used."

Sakoda, A. [**Experimental Studies on the Development of Hookworms in Unsuitable Hosts. I**] *Osaka Daigaku Igaku Zassi.* 1954, Mar., v. 6, No. 4, 291–305. [16 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"The author tried to infect human hookworm larvae to rabbits which were treated with repeated intravenous injection of human blood or red corpuscles, and obtained the following results.

"1. Almost all larvae in treated rabbits showed an increase in length and complexity of organs, compared with those in untreated animals.

"2. When whole blood was injected, the larvae past the third ecdysis

stage were not found, and when only red corpuscles were injected, the sexual differences were recognised in four worms out of six.

" 3. It took longer for the larvae to develop in unsuitable hosts [than] to develop in suitable hosts.

" 4. The migratory course of larvae in host is irregular, and the speed is also not constant.

" 5. From the above mentioned results, it should be concluded that in the treated rabbits the larvae of *A. duodenale* neither grow up to the adult nor establish their parasite life in the intestine of hosts."

Coutinho, J. O., Croce, J., Campos, R., Amato Neto, V. & Fonseca, L. C. Contribuição para o conhecimento da estrongiloidíase humana em São Paulo. [**Study of Human Strongyloidiasis in São Paulo, Brazil**] *Folia Clin. et Biol.* S. Paulo. 1953, Dec., v. 20, No. 3, 141–76, figs. 1–38 on pls. 1–16. 1954, Jan. & Feb., v. 21, Nos. 1 & 2, 19–48; 93–120, figs. 39–121 (on pls. 17–41 & 1 in text). [Numerous refs.]

This lengthy and comprehensive monograph was awarded the Arnaldo Vieira de Carvalho prize by the Society of Gastroenterology and Nutrition of São Paulo in 1952.

The authors begin by outlining the medico-social importance of this helminthic infection, which, in one series, was 12 per cent. in urban schoolchildren in São Paulo and 40 per cent. in those in a suburb. The life-cycle of the parasite lends itself to wider and more rapid infection of man than does that of *Ancylostoma* or *Necator*, which require more critical environmental conditions for their transmission: hence the frequency of *Strongyloides* infection in relatively good sanitary conditions.

The parasitological and epidemiological aspects are discussed and the incidence of infection in São Paulo, according to different workers, is surveyed. A table giving the results of 13 surveys between 1920 and 1949 (and one in 1885 by Lutz) shows percentages varying between 0·84 and 35; these surveys covered more than 30,000 examinations.

The various methods of laboratory diagnosis are outlined and the clinical features discussed in relation to different signs and symptoms. There then follow full clinical notes on 17 cases, profusely illustrated by skiagrams and tables of results.

Finally the symptomatology is reviewed, together with the results of the various pathological and radiological examinations, and the whole 17 cases finally discussed. There were only 2 deaths. The paper ends with a brief account of the several drugs employed in treatment, namely, gentian violet, iodine preparations, antimony derivatives and diethylcarbamazine; but it is concluded that a specific therapeutic agent has yet to be found.

For the great amount of informative detail the original paper should be consulted. *H. J. O'D. Burke-Gaffney*

Weinstein, P. P. **The Effect of Cortisone on the Immune Response of the White Rat to** *Nippostrongylus muris*. *Amer. J. Trop. Med. & Hyg.* 1955, Jan., v. 4, No. 1, 61–74, 6 figs. (5 on pl.). [30 refs.]

" Cortisone administered to white rats while they were being immunized to *Nippostrongylus muris* resulted in suppression of the inflammatory response in the skins of these animals when subsequently challenged with larvae, and apparently all of the larvae successfully penetrated through this

first barrier. Many, however, were trapped in a cellular reaction in the lungs, liver, and peritoneal membranes during their migrations, but a greater number matured to adults and were larger in size than in the nontreated immune controls.

"Rats immunized and then treated with cortisone for the first time a few days prior to the skin challenge with larvae also demonstrated some reduction in the over-all immune reaction; this was manifested by a suppression of the cellular response in the skin but not in the internal organs, and by an increased mean length of the adult worms as compared to the nontreated immune controls. However, there was no significant difference in number of adult worms developing in this group as compared to the controls.

"Filariform larvae incubated in serums obtained from all immunized groups, whether they had been treated with cortisone or not, showed excretory pore precipitate formation which was considerable in quantity."

FAIRBAIRN, D. **Lipids of the Female Reproductive Organs in** *Ascaris lumbricoides*. *Canadian J. Biochem. & Physiol.* 1955, Jan., v. 33, No. 1, 31–7. [27 refs.]

OTA, S. & TADOKORO, H. **On the Group-Specific Substance of** *Ascaris lumbricoides*. *Kurume Med. J.* 1954, v. 1, No. 2, 105–8.

"We prepared anti B, anti B_I, anti B_{II}, anti B_{III}, anti O_I, anti O_{II} and anti O_{III} precipitin sera in order to try precipitin tests and absorption tests with the extract of *Ascaris lumbricoides*. In these studies, the presence of B_{III} partial antigen of B group substance and O_{III} partial antigen of O group substance were confirmed in *Ascaris lumbricoides*."

MARUYAMA, M. & AOYAMA, J. [**Deposition of Bilirubin to Eggs of** *Ascaris lumbricoides*] *Hirosaki Med. J.* 1954, June 30, v. 5, No. 2, 97–101, 6 figs. on 2 pls. [In Japanese.] English summary p. *17.

An account of 3 cases.

ASAKURA, S. & SASAMURA, M. [**Eggs of** *Ascaris lumbricoides* **in the Wall of the Common Bile Duct**] *Hirosaki Med. J.* 1954, June 30, v. 5, No. 2, 102–5, 2 figs. [In Japanese.] English summary p. *18.

An account of 3 cases.

SHOUL, M. I. **Tuberculosis and Parasitism as Causes of Abdominal Pain in Korean Patients.** *New England J. of Med.* 1955, Jan. 13, v. 252, No. 2, 41–4. [25 refs.]

"In Korean patients there is an increased frequency of tuberculosis, a prevalence of tropical diseases as malaria and amebiasis, and an almost universal infestation with intestinal parasites. Ascariasis particularly complicates the management of surgical patients. Heavy infestations of intestinal parasites may be manifested by a clinical picture similar to that of the acute abdominal emergencies requiring laparotomy.

"Thirty-nine Korean patients with sudden severe abdominal colic, nausea, vomiting and epigastric tenderness were found to have large numbers of round worm (*Ascaris lumbricoides*), Old World hookworm (*Ancylostoma duodenale*) and whip worm (*Trichuris trichiura*) ova in their stools. Most of these patients had recently ingested unwashed vegetables grown in fields fertilized with human excreta. Ingestion of ancylostoma larvae as surface contaminants of vegetables produces the most severe abdominal symptoms. Ascariasis with abdominal pain cannot be distinguished from ancylostomiasis. The diagnosis of parasitic disease as the cause of abdominal pain is established by the clinical picture, stool examination and relief of symptoms with antihelminthic drugs.

"Infestation with the Chinese liver fluke, *Clonorchis sinensis*, may resemble obstructive jaundice. Carbasone reactions mimic the acute abdominal catastrophe.

"Needless laparotomy can be avoided by recognition of these abdominal syndromes."

Bunde, C. A., Blair, H. E., Burch, G. R. & Lee, J. W. **Ascaricidal Action of Cadmium.** *Proc. Soc. Exper. Biol. & Med.* 1954, Dec., v. 87, No. 3, 549–50.

"CdO mixed with dry ground grain and supplied as the only food for two or three days will effectively eliminate ascarids from pigs. The concentration shown to be effective is ·01% to ·02% and this mixture is palatable and readily eaten."

Yamaguti, S., Inatomi, S. & Kimura, M. **Recovery of a Chemical Fraction from Human Nightsoil having an Ovistatic Effect upon** *Ascaris lumbricoides* **Eggs.** *Exper. Parasit.* New York. 1955, Jan., v. 4, No. 1, 29–33.

"A preliminary chemical analysis of human nightsoil has revealed one fraction, insoluble in ether and ethanol but soluble in acetone and water, which has proved to have a definite inhibitory effect upon the development of *Ascaris* eggs. Further analyses of this fraction are under way."

McFadzean, J. A. **Filariasis in Gambia and Casamance, West Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, May, v. 48, No. 3, 267–73.

This paper describes an investigation of the incidence of filariasis in Gambia and the results of a survey of a village in the neighbouring French territory of Casamance. It was found that few lesions were produced by *Wuchereria bancrofti* in Gambia, but in Casamance this infection is known to be attended by a high morbidity.

The inhabitants of three villages (coastal, inland and swamp) in Gambia were examined, compound by compound, and this appears to be the only method by which it is possible to see all the people. Blood smears were made between 9·0 p.m. and midnight and were of 20 cmm. each, dehaemoglobinized, fixed with alcohol and stained with Mayer's haemalum. The only microfilariae found in the survey were those of *W. bancrofti* and *Dipetalonema perstans*.

The highest incidence of microfilariae of *W. bancrofti* in the blood was 38·3 per cent. in the coastal village. This figure, by statistical analysis, is significantly higher than that in the inland village (19·2 per cent.) and in the swamp village (25·9 per cent.). As regards sex incidence, parasitaemia in males over the age of 10 years in the inland village (31·1 per cent.) was significantly higher than in females (13·8 per cent.), but while males were more commonly infected than females in the other villages, the difference is not statistically significant. Only one child under 5 was found to harbour microfilariae in the blood. Above this age the incidence in all the villages increased up to the age of 40, after that only a small rise was observed.

The highest incidence of microfilariae of *D. perstans* was found in the inland village (68·6 per cent.) and this is significantly higher than that in the coastal zone (10·2 per cent.) and in the swamp village (12·9 per cent.), but there is no significant difference between the last two figures. There was an inverse relationship between the incidence of *W. bancrofti* and *D. perstans*, but it is difficult to determine the significance of this. The males, moreover, had a higher incidence than females. As in the case of *W. bancrofti* the incidence increased up to the age of 40.

Seven cases of elephantiasis of the lower limbs and 4 cases of hydrocele were discovered, indicating a low incidence, for there was only one of indigenous origin.

The village of Elana in Casamance was selected as it lies in close proximity to the river Casamance. The people are more primitive than those in Gambia and have lived most of their lives in the village, but they are heavier and better fed, so that anaemia is absent. Here the incidence of *W. bancrofti* was 39·5 per cent.; that of *D. perstans* 9·5 per cent. Except that 8·3 per cent. of children under 5 were infected these figures resembled those of the coastal village in Gambia. The average density of microfilariae of *W. bancrofti* here was less than in the coastal village. However, the morbidity was much higher; there were 22 cases of elephantiasis of the limbs (5·6 per cent.) and a considerable number of elephantiasis of the scrotum and of hydrocele. Males over the age of 10 had a higher incidence of *W. bancrofti* than females, although in the case of *D. perstans* the preponderance was significantly higher. Three-quarters of the cases of elephantiasis occurred between the ages of 30 and 50; the youngest patient was 15. The lower limbs were always affected. Out of a total of 31 cases of elephantiasis in the survey, 26 persons had no microfilariae in the blood and 5 had them. *Philip Manson-Bahr*

South Pacific Commission. Noumea, New Caledonia. **Mosquito-Borne Diseases. Filariasis. *Wuchereria bancrofti* from New Caledonia in relation to certain *scutellaris* Group Mosquitoes** [Backhouse, T. C. & Woodhill, A. R.]. *Technical Information Circular, No. 11.* 1954, Dec., 9 mimeographed pp.

This work forms part of an investigation planned by the South Pacific Commission with a view to determining the potentialities of mosquitoes of the *Aëdes scutellaris* complex from different regions of the South Pacific as regards their ability to act as intermediate hosts of *Wuchereria bancrofti*. The following mosquitoes were available: *Aëdes scutellaris scutellaris* from Lae, New Guinea, maintained since 1948; *A. s. katherinensis* from the Northern Territory of Australia, maintained since 1953; hybrids of these two; *A. s. pseudoscutellaris* from Fiji, maintained since 1953; *A. aegypti*

from the Gulf of Carpentaria, maintained since 1950; *Culex fatigans* from larvae obtained near Sydney.

The microfilaria donor was an adult male, a native of the East Coast of New Caledonia. Microfilaria counts, made in New Caledonia as well as Sydney, demonstrated a typical lack of periodicity. The numbers in 20 cmm. of finger blood were found to vary considerably from 14 to 50 in specimens taken consecutively. An attempt was made to check the intake of microfilariae by examining the gut contents of a few mosquitoes as soon as possible after the blood meal had been taken. Stained specimens always revealed greater numbers of microfilariae than unstained preparations. Very considerable variations in their numbers were experienced—from 1 to over 40. The figures proved sufficient to indicate that most of the fully fed mosquitoes ingested some microfilariae.

Results obtained with *Aëdes scutellaris pseudoscutellaris* (103 fully fed on the donor) were as follows. Of those dissected from the 4th to 19th day after the infecting meal 58 per cent. showed filarial larvae in some stage of development. The earliest 3rd stage larvae were seen on the 14th day. Of those dissected from that day onwards 46 per cent. showed larvae in some form or other and no less than 22 had fully developed individuals in abdomen, thorax, head or proboscis. That a greater proportion infected was not found is certainly due to larval loss after the 18th day. It now appears that, unless this escape from the proboscis sheath can be retarded by keeping mosquitoes at lower temperatures, all dissections must be carried out between 14 and 18 days after the infective feed.

Of the *scutellaris* group of mosquitoes—*A. s. scutellaris*, *A. s. katherinensis* and *A. s. pseudoscutellaris*—only the last-named proved a good experimental host of the New Caledonian *W. bancrofti*. None of 91 *A. s. scutellaris* showed development beyond the first stage (which occurred in 61 per cent.). One individual only out of 52 *A. s. katherinensis* showed complete development. The hybrid *scutellaris* × *katherinensis* strain showed only retarded forms (as in *A. scutellaris*) in 21 out of 45 insects dissected. *A. aegypti* proved inhospitable (170 dissected). In the case of *Culex fatigans* four attempts to feed about 40 on the donor failed except in the case of one individual mosquito which when dissected on the 14th day showed 5 actively motile, normally developing larvae approaching the third stage. *Philip Manson-Bahr*

Floch, H. L'intradermo-réaction chez les filariens. Étude comparée de deux antigènes (*D. medinensis* et *D. immitis*). [**Comparative Study of** *D. medinensis* **and** *D. immitis* **Antigens in the Intradermal Reaction in Filariasis**] *Arch. Inst. Pasteur de la Guyane Française. Publication No. 332.* 1954, July, 6 pp.

In view of the claims of Huard and Tran Anh [this *Bulletin*, 1951, v. 48, 666] of the value of antigens of *D. medinensis* and *D. immitis* in the diagnosis of human filariasis, the author has compared his results with these antigens on a group of 58 children, 6–12 years of age, having no clinical manifestations of filariasis, simultaneously with the result of a search for microfilariae (*W. bancrofti*). The antigen of *D. immitis* was prepared locally in Cayenne and diluted 1 in 8,000 and administered according to the American technique. Some of these children were carriers of microfilariae of *W. bancrofti*. A preliminary trial showed that there was no material difference in the reactions produced by 1 in 8,000 or 1 in 500 dilution of the antigen in a dose from one-tenth to one-third cc. The

reaction is immediate, appearing within 15–20 minutes. False reactions were visible only for a few minutes. It is recommended that control injections of dog protein material should be used. The *D. medinensis* antigen came from the Pasteur Institute in Paris.

The results are summarized in the following 2 tables:

TABLE I

Antigen	*No. of trials*	*Positive Intradermal*	*Negative Intradermal*	*Positive for Microfilariae*	*Negative for Microfilariae*
D. medinensis	58	8 (14%)	50 (86%)	17 (29%)	41 (71%)
D. immitis	55	32 (58%)	23 (42%)	17 (31%)	38 (69%)

TABLE II

Antigen	AGREEMENTS		DISAGREEMENTS		*No. of Examinations*
	Intradermal+ Microfilaria+	Intradermal− Microfilaria−	Intradermal+ Microfilaria−	Intradermal− Microfilaria+	
D. medinensis	2 (4%)	35 (60%)	6 (10%)	15 (26%)	58
	37 (64%)		21 (36%)		
D. immitis	13 (24%)	19 (34%)	19 (34%)	4 (8%)	55
	32 (58%)		23 (42%)		

These results speak for themselves. With *D. immitis* antigen the intradermal reaction coincided with the presence of microfilariae more frequently than with *D. medinensis* antigen.

While it is clear that *D. immitis* antigen is more specific than that of *D. medinensis*, even it is far from being very specific, and neither, in any case, gives more than a group reaction for filarial infection.

Philip Manson-Bahr

DESCHIENS, R. & FLOCH, H. Incidence de l'A.C.T.H. sur les hyperéosinophilies parasitaires de l'enfant. [**Effect of Corticotrophin on Parasitic Eosinophilia in Children**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 5, 680–95. [10 refs.]

The authors have continued investigations on the effect of corticotrophin, or of cortisone, injections on eosinophilia [this *Bulletin*, 1953, v. 50, 760, 978; 1954, v. 51, 299, 512 and 513]. In this paper they record the examination of the reaction in 25 indigenous children (5 to 14 years old) in French Guiana; all of these children had helminthic infections and an eosinophilia attributed to these infections. The parasites concerned were *Ascaris*, *Trichuris*, hookworm, and filarial infections; in 4 of 13 cases of filarial infection the parasite was identified as *Wuchereria bancrofti* but in the other 9 the diagnosis was made on a positive skin test with a filarial antigen. In the majority (92 per cent.) of the 25 patients the eosinophil count was

not reduced by an intramuscular injection of corticotrophin; in 96 per cent. of cases the total leucocyte count indeed increased, in some cases markedly, after the injection of the corticotrophin, whereas previously in similarly parasitized adults no such increase in the total leucocyte count had been noted after corticotrophin injections. The results are discussed and tabulated in considerable detail. *A. R. D. Adams*

Charles, L. J. **Control of *Culex fatigans* Wied. with Dieldrin: a Preliminary Report.** *Proc. Forty-First Ann. Meeting New Jersey Mosquito Extermination Ass. & Tenth Ann. Meeting Amer. Mosquito Control Ass.* Atlantic City, N.J. 1954, Mar. 9–12, 166–74, 2 figs. [10 refs.]

The successful use of DDT to exterminate *Anopheles darlingi* in British Guiana [Giglioli, this *Bulletin*, 1949, v. 46, 183] was also effective against *Aëdes aegypti* but not against *Culex fatigans*, vector of Bancroftian filariasis. The action of DDT on *C. fatigans* was only partial, in that 10 sprayings during 1945–53 reduced average house catches from 79 to 50; and microfilaria rates of people living in unsewered suburbs of Georgetown fell from 16·3 to 9·6.

The author describes an early trial of dieldrin house-spraying to suppress *C. fatigans*. Because the supplies of dieldrin were limited, and also to prevent confused results due to peripheral invasion, a small island was chosen for the site. This island, in the estuary of a river, was 3·4 × 1·3 miles in dimension, with a population of 138 living under conditions that favoured pullulation of *C. fatigans*.

After an initial mosquito survey, all buildings were sprayed inside with dieldrin emulsion or dispersion at a rate of approximately 16 mgm./sq. ft. A second application was given 10 months later. No larvicidal treatments were given at first, but after 9 weeks positive foci and from the 17th week all breeding sites were treated weekly with dieldrin powder at 1 p p.m.

Results of surveys showed a drastic reduction of *C. fatigans* from a house-catch average of 21 to a figure around 1 during the first 15 weeks. From the 17th week to the 75th week the catch was zero, except for small numbers caught in weeks 21, 35, 39 and 63. Results of larval surveys were rather similar.

The result of the trial clearly emphasized the effectiveness of the dieldrin. It seemed quite possible that the intermittent captures of *C. fatigans* may have been due to introduced specimens from river steamboats.

J. R. Busvine

World Health Organization. Technical Report Ser. No. 87. **Expert Committee on Onchocerciasis. First Report.** Mexico City, 23 November–1 December 1953. 37 pp., 5 figs. Geneva: 1954, Dec. [1s. 9d.; $0.25; Sw.fr. 1.–.]

This publication presents a brief review of our present knowledge of onchocerciasis, together with a summary of the opinions and recommendations of the Committee on such subjects as: proposed standardization of epidemiological surveys; methods of control of the parasite; methods of control of the vector; suggestions for further research. The report concludes with two previously unpublished documents. The first of these describes a technique for testing the susceptibility of larvae of simuliids to insecticides. The second paper gives an account of the methods which may

be used to estimate the amount of river discharge, thereby enabling the observer to calculate the quantity of insecticide required for the control of *Simulium* larvae throughout a selected stretch of water. In addition the report contains a list of " Unpublished Working Documents " the contents of which were discussed at the meeting. [This report does not lend itself to further summarization and should be read in the original by all who are interested in onchocerciasis.] *R. M. Gordon*

Miyazaki, I. **Studies on *Gnathostoma* occurring in Japan (Nematoda: Gnathostomidae). I. Human Gnathostomiasis and Imagines of *Gnathostoma*.** *Kyushu Mem. Med. Sci.* Fukuoka. 1954, June, v. 5, No. 1, 13–28, 10 text figs. & 21 figs. on 2 pls. [36 refs.]

Three species of *Gnathostoma* occur in Japan: *G. spinigerum* in cats and dogs; *G. nipponicum* in the Japanese weasel, *Mustela sibirica itatsi*; and *G. doloresi* in hogs and in the Japanese boar, *Sus scrofa leucomystax*. The three species can be differentiated morphologically by the shape and distribution of the cuticular spines on the surface of the body and also by the shape and size of the eggs.

Only *G. spinigerum* has been reported as a parasite of man, in whom it causes migrating intermittent oedema usually, and more rarely a creeping eruption. The cutaneous lesion is associated with intensive infiltration of leucocytes, especially eosinophil cells. Examples of the lesions are illustrated by photographs. Human infections, which are said to be increasing and spreading to other areas, are brought about by consumption of 2 species of freshwater fish, *Ophicephalus argus* and *O. tadianus*, which harbour the larval stages. *O. argus* is more widely distributed, and in Saga and Fukuoka Prefectures 57·6 per cent. of 1,229 examined were found infected. *O. tadianus* from Hyogo Prefecture was found infected with an incidence of 14·4 per cent. of 111 examined. The skin test is reported to be a convenient and reliable means of diagnosis in man. Treatment is by surgical removal of the larvae from the skin lesions. *J. J. C. Buckley*

Singh, S. N. & Rao, V. R. **On a Species of *Physaloptera* causing a Subcutaneous Abscess in the Neck of an Indian.** *J. Helminthology.* 1954, v. 28, Nos. 3/4, 155–8, 4 text figs. & 1 fig. on pl.

" A case of human infection with *Physaloptera* causing an abscess in the neck of a patient in Hyderabad is recorded. The structure of one of the worms recovered, a female, is described and compared with that of other species recorded from mammals in India, but in the absence of the male it is not possible to determine the species."

Rachelson, M. H. & Ferguson, W. R. **Prevalence of Pinworm Infestation at a Military Installation.** *U.S. Armed Forces Med. J.* 1955, Jan., v. 6, No. 1, 60–66. [33 refs.]

" Enterobiasis is prevalent throughout the world. At this hospital, examination of 505 children between the ages of one to 12 years by means of cellulose tape swabs revealed that 31·6 percent of the children had enterobiasis. All medical officers should be aware of the pinworm problem, and efforts should be made to diagnose the infestation so that treatment and prevention can be carried out."

ZAIMAN, H. & SAFHOLM, R. D. **Studies on the Nature of Immunity to *Trichinella spiralis* in Parabiotic Rats. VI. The Origin and Distribution of Larval *Trichinella* in the Muscles of Parabiotic Rats following a Single Infection of One Twin.** *Amer. J. Hyg.* 1955, Jan., v. 61, No. 1, 1–4.

"Relatively few larvae become established in the musculature of the 'uninfected' rat following infection of its mate. It was further shown that the muscle larvae in the 'uninfected' rat are probably derived from adult worms in the intestines of the infected rat. It follows that the enhanced resistance of the 'uninfected' rat following infection of its mate is not due to accidental ingestion of *Trichinella* originally intended for its mate."

ZAIMAN, H., STONEY, J. M., RUBEL, June & HEADLEY, N. C. **Studies on the Nature of Immunity to *Trichinella spiralis* in Parabiotic Rats. VII. The Immune Response of the "Uninfected" Twin One Month after its Mate received an Immunizing Dose of Irradiated (X Ray) Larvae.** *Amer. J. Hyg.* 1955, Jan., v. 61, No. 1, 5–14.

"Infection of one member of a pair of parabiotic rats with a single dose of irradiated (x ray) *Trichinella spiralis* was adequate to make that rat resistant to infection with nonirradiated larvae 1 month later. It was further shown that when one such twin was infected with irradiated larvae its 'uninfected' mate became more resistant to infection with that parasite than were rats in control pairs. The strength of the resistance in the infected rat was greater than that shown by the 'uninfected' twin."

ZAIMAN, H., STONEY, J. M. & HEADLEY, N. C. **Studies on the Nature of Immunity to *Trichinella spiralis* in Parabiotic Rats. VIII. The Duration of the Immune Response in the "Uninfected" Parabiotic Rat following Infection of One Twin with *Trichinella spiralis*.** *Amer. J. Hyg.* 1955, Jan., v. 61, No. 1, 15–23.

"The resistance produced in the 'uninfected' member of a pair of parabiotic rats following infection of its mate persisted for as long as 11 months after immunization. Immunization of one parabiont with reproductively sterilized (x-rayed) *Trichinella* was also effective in producing long-lasting (5 months) resistance in both members of the pairs."

DEFICIENCY DISEASES

HAMASHIMA, Y. **Beri-Beri Allergy. Sero-Immunological Studies of Rabbits suffering from Rice-Disease.** *Acta Path. Japonica.* 1953, July, v. 3, No. 3, 95–104, 3 figs. [14 refs.]

HAMASHIMA, Y. **Beri-Beri Allergy. Alterations of the Permeability of Blood Vessels and the Serum-Protein Fractions in Rabbits suffering from Rice-Disease.** *Acta Path. Japonica.* 1953, July, v. 3, No. 3, 105–16, 1 fig. [23 refs.]

Malaguzzi-Valeri, C. & Orabona, Maria L. Azione dell'aureomicina sul beri-beri sperimentale e sull'efficacia terapeutica dell'aneurina. [**The Action of Aureomycin in Experimental Beriberi and on the Efficacy of Thiamin**] *Internat. Ztschr. f. Vitaminf.* Berne. 1955, v. 25, No. 4, 402–6. [15 refs.]

The English summary appended to the paper is as follows:—
"Aureomycin does not inhibit the action of thiamin on the polyneuritic pigeon: even large doses have no effect on the curative role of thiamin or on the action of cocarboxylase."

Corkill, N. L. **Seasonal Dietary Change in a Sudan Desert Community.** *J. Trop. Med. & Hyg.* 1954, Nov., v. 57, No. 11, 257–69, 11 figs. & 1 chart.

In this paper the author summarizes and re-evaluates the observations made at Abu Deleig in the Butana desert between 1933 and 1946 and previously reported [this *Bulletin*, 1950, v. 47, 1027; 1951, v. 48, 390]. More detailed dietary data are given, based on weighings of the food of five families for one week.

The extreme seasonal variation in the availability of milk and any green food for man or beast leads to recurrent periods of dietary shortage, particularly of animal protein, vitamin A and vitamin C. A corresponding clinical picture of polyhypovitaminosis is seen at the end of each hot dry season, the dominating symptom being *pyralgia* [which must surely be the same as "burning feet" so often described in the Far East]. Signs of B-Complex deficiency are common, for which it is difficult to account on dietary grounds, and the author suggests that these deficiencies may be due to failure of absorption in the presence of hypochlorhydria due to protein deficiency. The value of fermented millet beer in the prevention of this deficiency syndrome is emphasized. *Dean A. Smith*

Winckel, W. E. F. **Irreparable Changes of the Spinal Cord after Pellagra.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1954, Dec., v. 6, No. 4, 296–302, 6 figs.

This paper describes the clinical features and pathological findings in one patient, who was a prisoner-of-war in Macassar in 1944. Here he developed a variety of signs and symptoms attributable to nutritional deficiencies. These included a well-marked ataxia. He died subsequently in Holland and at autopsy degeneration of the posterior columns of the spinal cord were found. The Wassermann and Meinecke reactions were negative.

[There can be no doubt that this patient developed irreparable changes in the spinal cord while a prisoner-of-war. Probably this could be attributed to his poor diet at that time, but the brief clinical description given is insufficient to support the initial diagnosis of pellagra and it would appear to be at least dubious whether he ever had this disease—at least in its typical form as seen in endemic areas.] *R. Passmore*

Autret, M. & Behar, M. Le syndrome de polycarence de l'enfance en Amérique centrale (kwashiorkor). [**Kwashiorkor in Central America**] *Bull. World Health Organization.* Geneva. 1954, v. 11, No. 6, 891–966, 15 figs. [11 (4 coloured) on 6 pls.]. [97 refs.]

Venkatachalam, P. S., Srikantia, S. G. & Gopalan, C. **Clinical Features of Nutritional Oedema Syndrome in Children.** *Indian J. Med. Res.* 1954, Oct., v. 42, No. 4, 555–68, 5 figs. on 2 pls. & 1 graph. [27 refs.]

This paper describes the clinical features in 207 children, mostly belonging to tea-plantation labourers, who suffered from the syndrome. All had oedema and had failed to grow adequately. Sixty-one per cent. had diarrhoea, 10 per cent. enlarged liver, 39 per cent. skin lesions (crazy-pavement dermatosis, scaly skin and purpuric spots), 48 per cent. hair changes (discoloration or alopecia either separately or together) and 36 per cent. had eye changes attributable to vitamin A deficiency (xerosis or keratomalacia). The children were mostly aged 1 to 4 years, but some were older. All had been breast fed, but subsequently weaned on to inadequate rice diets. The basis of the treatment was skimmed milk and most responded well, but the mortality was 7·9 per cent.

[The authors state that the cases closely resemble kwashiorkor, but that they prefer the designation nutritional oedema syndrome. The children came from homes where economic conditions were very poor and the diets of many were clearly deficient in calories. Probably many of the cases could be properly described as famine oedema. The age incidence of the condition was higher than is usual in kwashiorkor. The authors do not consider in detail the differential diagnosis between kwashiorkor and famine oedema. Perhaps the two conditions are so closely associated in these children that it is impractical to attempt to separate them. It would be interesting to know if the hair changes, so common in African kwashiorkor, were chiefly found in the younger age-group, among whom kwashiorkor is more frequently found.] *R. Passmore*

Bras, G. & Clearkin, K. P. **Histopathology of the Pancreas in Jamaican Infants and Children.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1954, Dec., v. 6, No. 4, 327–30, 1 chart.

This paper summarizes the histological findings in the pancreas at 49 consecutive autopsies in children under 11 years of age in Jamaica. Sixteen of the children died of kwashiorkor or marasmus, and in 13 of these the pancreas was abnormal. The chief findings were atrophy, degeneration of acinar cells, dilatation of ducts, an apparent increase in intercalated ducts and fibrosis. In the miscellaneous group of 33, 22 had fatty livers, and in 15 of these there were also changes in the pancreas. Clearly nutritional and other disorders of the liver in Jamaican children are closely associated with changes in the histology of the pancreas.

R. Passmore

Jelliffe, D. B., Bras, G. & Stuart, K. L. **The Clinical Picture of Veno-Occlusive Disease of the Liver in Jamaican Children.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 386–96, 4 figs. on pl. & 1 text fig. [26 refs.]

This paper gives a fuller clinical picture of children in Jamaica suffering from veno-occlusive disease of the liver, the pathology of which has already been described by the authors [this *Bulletin*, 1954, v. 51, 972, 973; 1955, v. 52, 394]. The disease can be described in three stages.

i. The acute stage is characterized by a sudden onset of abdominal distension due to liver enlargement. Ascites is usual, but jaundice and

splenomegaly are not often present. The child may go downhill rapidly and die in coma from liver failure in a few days. Some of the children, however, appeared to make a complete recovery with or without any improvement in the diet. Alternatively the disease may enter the next stage.

ii. The subacute stage is characterized by a persistent, firm, smooth enlargement of the liver. There is often recurrent ascites and evidence of portal obstruction. This stage may be followed by complete recovery, but more often after periods of clinical improvement the final stage develops.

iii. The chronic stage presents features of cirrhosis of the liver indistinguishable from other types of cirrhosis. Jaundice, ascites, splenomegaly, dilated collateral veins and haematemesis may all be present. There appears to be a high mortality.

The last two stages may occur without a definite history of the first stage. [If this abstract appears vague, it reflects the original paper which is based on only 11 cases. The authors are much less certain of the characteristic clinical features and course of the disease than of the histological picture already described, where the findings appear very definite.]

R. Passmore

Popper, H. & Schaffner, F. **Nutritional Hepatic Injury.** *Arch. Intern. Med.* 1954, Nov., v. 94, No. 5, 785–800, 5 figs. [86 refs.]

This text of a lecture given at the annual meeting of the American Medical Association is a well-documented summary of both the clinical and experimental work on nutritional liver injury. For anyone who wishes to obtain a clear and concise statement of the present position in this very difficult field of investigation, this paper is strongly recommended.

R. Passmore

SPRUE

Haex, A. J. C. & Lips, J. B. Nieuwe mogelijkheden bij de behandeling van spruw. [**New Possibilities in the Treatment of Sprue**] *Nederl. Tijdschr. v. Geneesk.* 1955, Jan. 8, v. 99 (i), No. 2, 102–6, 3 figs. (2 on pl.). [17 refs.]

The English summary appended to the paper is as follows.—

"ACTH therapy of sprue may effect a partial, but often satisfactory improvement, even though the mechanism is not understood. Recent information indicates that a gluten-free diet of the type used in treating coeliac disease in children should be tried first. The authors describe a patient who had suffered from severe sprue for years. A gluten-free diet as a sole therapy caused all symptoms to disappear within a few weeks."

HAEMATOLOGY

Fukushima, K., Senda, N., Ishigami, S., Ishii, M., Tamai, Y., Murakami, Y. & Nishian, K. **Studies on Galvanotaxis of Leukocytes. II. Galvanotaxis of Eosinophils in Healthy Human Adults and various Diseases.** *Med. J. Osaka Univ.* 1954, Aug., v. 5, Nos. 2/3, 263–70.

White cells were suspended at various hydrogen ion concentrations and an electric current was passed through the medium. In plasma neutrophils moved towards the positive pole whereas eosinophils from cases with asthma, eczema and ascariasis showed little or no movement. When plasma was replaced by a buffer of *p*H 8 the eosinophils showed a definite movement. Eosinophils from patients with ankylostomiasis, however, showed galvanotaxis at *p*H 7. The authors suggest that these experiments may contribute towards the understanding of the selective stimuli brought to bear by different pathological processes on different types of leucocytes.

H. Lehmann

Mueller, J. F. & Will, J. J. **Interrelationship of Folic Acid, Vitamin B_{12} and Ascorbic Acid in Patients with Megaloblastic Anemia.** *Amer. J. Clin. Nutrition.* 1955, Jan.–Feb., v. 3, No. 1, 30–44, 14 figs. [19 refs.]

The authors discuss the various concepts of nutritional interrelations in the causation of macrocytic anaemia. According to them vitamin B12 is involved particularly in the formation of nucleosides from thymine and acts at the erythroid cellular level. Folic acid has its influence on the formation of thymine and acts in a series of steps leading from folic acid conjugates *via* folic acid to folinic acid (citrovorum factor) and to as yet unknown active folic-acid-like substances. Ascorbic acid seems to be involved in the utilization of folic acid. Vitamin B12 deficiency leads to pernicious anaemia direct whereas the folic acid system produces sprue, megaloblastic anaemia of infancy and pernicious anaemia of pregnancy, etc., according to the particular stage at which the conversion of the folic acid conjugates to the active folic-acid-like substances is interfered with.

In addition to clinical studies the authors have determined the nucleic acids of persons with megaloblastic anaemia in the bone-marrow and have found that the ratios of uracil to thymine, thymine to total bases and ribosenucleic acid (RNA) to desoxyribosenucleic acid (DNA) were all different from those found in normal persons. In patients with megaloblastic anaemia the RNA:DNA ratio was doubled. On treatment with adequate doses of vitamin B12 they returned to the normal range. In pernicious anaemia the authors postulate that folic acid therapy will temporarily correct the effect of nucleoprotein metabolism by mass action but, as eventually a greater deficiency of vitamin B12 must occur, haematological relapse and progressive neurological disease must result. In the pernicious anaemia of pregnancy and megaloblastic anaemia refractory to vitamin B12 the abnormalities are caused by deficiencies in the folic acid system and they can therefore be cured by folic acid. *H. Lehmann*

Das Gupta, C. R. **Anaemia in Pregnancy: a Critical Review. With Recommendations for Future Lines of Work in India.** *Indian J. Med. Res.* 1954, July, v. 42, No. 3, 411–74. [Numerous refs.]

This is a valuable review of the work done on the subject of anaemia in pregnancy with special reference to the conditions in India; there are over 150 references to the literature.

There are numerous physiological changes in the blood in pregnancy. Of these the most important is an increase in the volume of the blood, but there is also an actual increase in the total number of red cells and of the total amount of haemoglobin in the body, although counts of measured volumes of blood indicate a reduction; that is, the increase in total blood volume exceeds that of the red cells. The author considers that in Indian women the lowest limit of physiological dilution should be considered as haemoglobin 9·5 gm. per 100 ml. and red cells 3·35 millions per cmm.

The anaemias of pregnancy are classified pathologically as dyshaemopoietic, haemorrhagic and haemolytic, and haematologically as macrocytic orthochromic, macrocytic hypochromic, normocytic orthochromic, normocytic hypochromic, and microcytic hypochromic.

The author gives two long tabular statements contrasting the clinical, haematological and biochemical findings and the response to various therapeutic agents in macrocytic anaemia of pregnancy, in India and in the West (Europe and America).

His recommendations for prevention include planned motherhood, subsidized diet, eradication of infection, prophylactic medication, regular blood examinations, training of midwives, anaemia clinics, a haematological research unit which would standardize the teaching of haematological methods and research, and propaganda. The research programme included studies of healthy young pregnant girls in their first and second pregnancies, both those taking ordinary diet without supplements and those taking in addition medicinal prophylactics of various kinds; a survey of pregnancy anaemia in hospitals and dispensaries; studies in gastric acidity in pregnancy, in normals, and in patients with anaemia; a clinical and haematological follow-up of infants of anaemic parents; bone-marrow studies in the various types of anaemia; the association of toxaemia and anaemia; the incidence of haemorrhagic manifestations; and autopsy findings in anaemia of pregnancy. *L. E. Napier*

Walters, J. H. & Young, N. A. F. **Micro-Drepanocytic Disease associated with Megaloblastic Anaemia of Pregnancy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1954, May, v. 48, No. 3, 253–60, 2 figs. on pl. & 3 graphs. [27 refs.]

"(1) An example of micro-drepanocytic disease, arising from the inheritance of the trait of thalassaemia from the father and of the sickle-trait from the mother, is described in an Arab girl.

"(2) The condition was complicated by megaloblastic anaemia of pregnancy, and by the development of an antibody following transfusion.

"(3) The characteristic features were originally masked by secondary hypersplenism, and great symptomatic improvement followed splenectomy.

"(4) The heredity of the condition and the significance of the presence of abnormal types of haemoglobin are discussed."

Aksoy, M. **Sickle-Cell Trait in South Turkey.** *Lancet.* 1955, Mar. 19, 589–90. [27 refs.]

The author discovered at Mersin, on the southern coast of Turkey, a small inbred community among whom the incidence of the sickle-cell trait was 13·3 per cent. The ancestors of this group had been immigrants from Syria and Egypt several centuries ago, and there was no known admixture

of Negro blood. The number of persons examined was 376, and the author also mentions that he has seen 15 cases of sickle-cell anaemia.

H. Lehmann

Roberts, D. F. & Lehmann, H. **A Search for Abnormal Haemoglobins in some Southern Sudanese Peoples.** *Brit. Med. J.* 1955, Feb. 26, 519–21. [28 refs.]

"No abnormal haemoglobin was discovered by paper electrophoresis of 75 blood specimens from northern Nilotes of the Southern Sudan. In 739 specimens examined no sickling was found. These findings suggest that the association between malaria and sickling is more complex than might at first appear; their anthropological significance is discussed."

Jacob, G. F. **A Survey for Haemoglobins C and D in Uganda.** *Brit. Med. J.* 1955, Feb. 26, 521–2.

"In a series of 500 non-sickling bloods examined in Kampala no example of haemoglobins C or D has been found. Since, on the other hand, there is known to be a considerable amount of haemoglobin C in West Africa, it is probable that this area is the source of the genes for haemoglobin C found in American negroes. This is, in any case, the most likely source, since the slaves largely came from this area. Most, if not all, of the haemolytic anaemias in Uganda, in which sickling appears to play a part, may therefore prove to be true cases of homozygosity for the sickling gene. There remains, however, the possibility that other modifying haemoglobins exist here which could be distinguished by properties other than electrophoretic mobility at alkaline *p*H."

Smith, E. W. & Conley, C. L. **Sicklemia and Infarction of the Spleen during Aerial Flight. Electrophoresis of the Hemoglobin in 15 Cases.** *Bull. Johns Hopkins Hosp.* 1955, Jan., v. 96, No. 1, 35–41. [19 refs.]

"Electrophoretic analysis of the hemoglobin of 15 individuals who developed splenic infarcts during flight was performed. Sickle hemoglobin was demonstrated in all 15, and C hemoglobin in 3. Evidently flying is hazardous to persons with sickle-cell-hemoglobin C disease, because of the risk of splenic infarction. Splenic infarcts may develop during flight in individuals who have only sickle cell trait."

[See this *Bulletin*, 1955, v. 52, 83.]

Arduino, L. J. **Urologic Complications of Sickle Cell Disease.** *Amer. Surgeon.* 1954, Nov., v. 20, 1213–18. [Summary taken from *J. Amer. Med. Ass.* 1955, Feb. 5, v. 157, No. 6, 551.]

Arduino reports that a review of the records of the Lake City, Fla., Veterans Administration Hospital from April, 1947, to April, 1953, revealed 13 cases of sickle cell disease. From September, 1949, to April, 1953, eight of these patients were observed and treated by the author. Seven had gross hematuria, and the eighth had priapism. The relationship of sickle cell disease to hematuria and priapism becomes more apparent as increased clinical observations of such cases are reported. The pathogenesis of hematuria in sicklemia is obscure. Of the seven patients here reported, two had been subjected to nephrectomy, only to have hematuria recur from the remaining kidney. Another patient apparently had renal bleeding from

the left kidney in 1943 and the right kidney in 1950. The findings in these three patients cause one to reflect seriously on the advisability of nephrectomy. In none of the five patients who still had both kidneys was it found necessary to do a nephrectomy. The hematuria subsided in all seven patients after a variety of therapeutic measures. Repeated blood transfusions, antibiotics (mainly penicillin), sulfonamides (Gantrisin) and methylene blue seemed most beneficial. On the basis of suggestions made by other investigators it may be assumed that an excess of androgenic hormone plays a causal role in sickle cell disease. The beneficial results of diethylstilbestrol (Stilbestrol) therapy reported by some also suggest this androgenic factor. Bishydroxycoumarin (Dicumarol), which was recommended by Smith for priapism, proved of no value in the patients observed by Arduino. The author concludes that, in the Negro race, sickle cell disease should be considered a possible causal factor in hematuria or priapism. Surgery for either complication is to be avoided until after intensive conservative therapy had been employed.

Gross, Ruth T., Kriss, J. P. & Spaet, T. H. **The Hematopoietic and Goitrogenic Effects of Cobaltous Chloride in Patients with Sickle Cell Anemia.** *Pediatrics.* Springfield, Ill. 1955, Mar., v. 15, No. 3, 284–90, 5 figs. [16 refs.]

"Four children with sickle cell anemia were treated with cobaltous chloride. In each case there was an initial satisfactory hematopoietic response. This response could not be sustained with prolonged therapy, and in 3 children the hemoglobin concentration dropped below the pre-treatment values. All 3 children in whom thyroid function was evaluated developed enlargement of the thyroid gland. One developed severe myxedema, and 2 developed laboratory evidence of depressed thyroid function. Thyroid biopsies were performed in 2 and showed extreme hyperplasia. The clinical and laboratory findings reverted to normal when cobalt was withdrawn. "It seems clear that cobaltous chloride is a goitrogenic agent in man. The anemia which recurs with prolonged therapy is unexplained. It may be secondary to hypothyroidism or to other causes.

"Indiscriminate use of cobalt as a hematinic should be avoided."

Portier, A., Cabannes, R. & Massonnat, J. Evolution des hémoglobinogrammes dans un cas d'hémoglobinose C (homozygotisme) traité par splénectomie. [**The Evolution of the Haemogram in a Patient with Haemoglobin C (Homozygote) Treated by Splenectomy**] *C.R. Soc. Biol.* 1954, Nov., v. 148, Nos. 21/22, 1779–83, 2 figs.

El-Dewi, S., Aziz, S. & Bebawi, E. **Study of Target Oval Cell Syndromes in Three Generations of an Egyptian Family.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 8, 947–55, 1 diagram & 3 figs. on 2 pls. [15 refs.]

The authors refer to Dameshek's studies of Cooley's anaemia (*Bull. New England Med. Center*, 1943, v. 4, 67). He described a continuous chain of anaemic states, varying in severity from Cooley's anaemia to conditions with mild hypochromic anaemia, target, oval and stippled cells, to which he gave the generic name of "familial Mediterranean target oval cell syndromes". The authors describe 3 of these conditions which were found in one family. They were: "target cell anaemia", the adult anerythroblastic type of Cooley's anaemia; "hypochromic polycythaemia" with

splenomegaly and target and oval cells; and "hypochromic anaemia with target cells" without splenomegaly, reticulocytosis or jaundice but with target, oval and stippled cells. *H. Lehmann*

VENOMS AND ANTIVENENES

Grasset, E. & Schwartz, D. E. Fractionnement par électrophorèse sur papier du venin de *Vipera russellii*. Propriétés et dosages des facteurs coagulant et anticoagulant de ce venin. [**Fractionation of *Vipera russelli* Venom by Electrophoresis on Paper. Properties and Estimation of Coagulant and Anticoagulant Factors**] *Ann. Inst. Pasteur.* 1955, Mar., v. 88, No. 3, 271–81, 1 fig. [18 refs.]

The following is a translation of the authors' summary:—

The venom of *Vipera russelli* contains a coagulant principle (analogous to a thrombokinase) and an anticoagulant principle (analogous to an antithrombin). The presence of these two factors may be shown by studying the properties of crude venom and its electrophoretic fractions.

The venom is separated by electrophoresis on paper between *p*H 8 and 9·3 into 8 fractions, of which 5 are the principal ones: these are eluted and their respective activities tested *in vitro* and *in vivo*.

The anticoagulant activity is found in fraction 5, 80 per cent. of the coagulant activity in fraction 3 and 20 per cent. in fraction 4: the proteolytic activity on gelatin is found in fraction 3.

In the conditions of these experiments, the coagulant activity of fraction 3 could not be separated from its proteolytic activity. [See also this *Bulletin*, 1955, v. 52, 293.] *H. J. O'D. Burke-Gaffney*

Camera, A. & Russo, N. Azione del veleno di cobra sulla coagulazione del sangue "in vitro". [**Action of Cobra Venom on Coagulation of Blood in vitro**] *Riv. Istituto Sieroterap. Ital.* 1954, Nov.–Dec., v. 29, No. 6, 559–68. [16 refs.]

The English summary appended to the paper is as follows:—

"The action of cobra venom on blood coagulation has been investigated 'in vitro'. The results show an antithromboplastin and antiprothrombin activity. The thrombin and fibrinogen are unaffected."

Yang, Chen-chung & Chang, Liang-tien. **Studies on the Phosphatases Activities of Formosan Snake Venoms.** *J. Formosan Med. Ass.* 1954, Oct., v. 53, No. 10, 609–15, 4 figs. [13 refs.]

Tange, Y. Beitrag zur Kenntnis der Morphologie des Giftapparates bei den japanischen Fischen, nebst Bemerkungen über dessen Giftigkeit. VII. Über den Giftapparat bei *Inimicus japonicus* (Cuvier et Valenciennes). [**The Morphology of the Poison Apparatus of Japanese Fishes and Observations on their Toxicity; VII.** *Inimicus japonicus*] *Yokohama Med. Bull.* 1954, June, v. 5, No. 3, 234–42, 5 figs. [16 refs.]

TOXOPLASMOSIS

Pangalos, G. E. & Mercier, P. [**Experimental and Epidemiological Researches on Toxoplasmosis in Greece**] *Arch. Hyg.* Athens. 1954, Jan.–Mar., Nos. 1/3, 5–15. [In Greek.] English summary.

The discovery of some infections in children in which microphthalmia, hydrocephalus and other clinical features suggestive of toxoplasmosis were present led the authors to study the probability of the presence of toxoplasmosis in Greece.

The authors consider that the dye test is the safest means of detecting the infection: it was negative in 62 adults tested, including 9 pregnant women with history of previous abortions. The test was regularly positive in experimental animals.

No toxoplasms were found in the cerebrospinal fluid of children with suspicious clinical manifestations. In only one child was the dye test positive and then at no higher a titre than 1/64; as the test was also positive in the mother, the case was considered to be one of toxoplasmosis.

Antigens prepared either from chicken embryo cultures or from peritoneal fluid of infected mice gave unsatisfactory skin reactions.

Examinations of a limited number of wild, domestic and laboratory animals were all negative for toxoplasms. The authors suggest that the disease is not very prevalent in animals in Greece.

Aureomycin was unsatisfactory in the treatment of infected mice.

H. J. O'D. Burke-Gaffney

Finckh, E. S. **Intercurrent Infection with *Toxoplasma*: Organisms found in the Bone Marrow of a Patient with Advanced Reticulosarcoma.** *Med. J. Australia.* 1954, Dec. 18, v. 2, No. 25, 965–7, 4 figs. on pl. [27 refs.]

"1. Toxoplasma infection in humans is briefly discussed.

"2. The possibility of significant incidence in Australia is suggested.

"3. Intercurrent infection with toxoplasma has been presumed in a patient with advanced reticulosarcoma after the finding in the bone marrow of organisms of appropriate morphology."

O'Reilly, M. J. J. **Acquired Toxoplasmosis: an Acute Fatal Case in a Young Girl.** *Med. J. Australia.* 1954, Dec. 18, v. 2, No. 25, 968–70, 9 figs. on pl.

"1. A case of acute fatal toxoplasmosis in a girl, aged ten years, is described.

"2. Inflammatory lesions were present mainly in the myocardium and lung.

"3. Organisms morphologically identical with toxoplasma were found in the myocardium, cerebral cortex, lung, liver and lymph glands."

Beverley, J. K. A., Skipper, E. & Marshall, S. C. **Acquired Toxoplasmosis with a Report of a Case of Laboratory Infection.** *Brit. Med. J.* 1955, Mar. 5, 577–8. [15 refs.]

A case of toxoplasmosis is described arising by accidental inoculation of a laboratory worker [see this *Bulletin*, 1954, v. 51, 509]. The dye test rose to 1 in 4.000 and the complement-fixation test to 1 in 16. The illness ran a course like glandular fever, but the Paul-Bunnell test was negative. An

uneventful clinical recovery was made. Attempts to isolate toxoplasms from the patient's blood were unsuccessful. Six other cases of laboratory infection are reviewed. *I. A. B. Cathie*

Cathie, I. A. B. *Toxoplasma* **Adenopathy in a Child with Isolation of the Parasite.** *Lancet.* 1954, July 17, 115–16.

In a preliminary communication (*Lancet*, 1954, Apr. 17, 813), the author drew attention to a disease like glandular fever in children with positive serological tests for toxoplasmosis: he is now reporting the isolation of *Toxoplasma* from one of these children. The boy was aged 5 years and had enlarged glands in the posterior triangle of the neck: he was afebrile. The Paul-Bunnell test was negative, but the *Toxoplasma* tests were positive—dye-test titre 1 in 512 and complement-fixation test 1 in 32; the titres showed a rising tendency. Parents, siblings and a domestic puppy gave negative results. Three months later the glands were no longer palpable and the child was quite well.

Toxoplasma was isolated from the patient's blood by single passages through mice to mice and through guineapigs to mice, and from the saliva by single passages through mice to mice. Controls were carried out to exclude infection in the stock of mice. The strain of *Toxoplasma* isolated was compared with the stock strain biologically and serologically and found to be identical.

Toxoplasma is an obligate intracellular parasite of domestic and wild animals, and of man; it has been shown that half the adult population have antibodies in their blood. The author thinks it unlikely that so many people will have eaten uncooked rabbit or other infected food, and suggests that infection may be transmitted *via* the saliva, *e.g.*, by kissing.

L. E. Napier

Unseld, D. W. Lungentoxoplasmose. [**Toxoplasmosis of the Lung**] *Deut. med. Woch.* 1955, Feb. 4, v. 80, No. 5, 173–5, 6 figs. on pl.

Four cases of lung infection with involvement of the hilar lymph nodes in adults are described, in whom the causal agent was thought on serological grounds to be a toxoplasm. The organism was not recovered from any of the patients. The differential diagnosis, course and treatment are discussed and the reasons for believing that these were cases of toxoplasmosis are presented.

[Many will find the dye-test titres too low to carry conviction.]

I. A. B. Cathie

Woods, A. C., Jacobs, L., Wood, R. M. & Cook, M. K. **A Study of the Role of Toxoplasmosis in Adult Chorioretinitis.** Reprinted from *Amer. J. Ophthalm.* 1954, Feb., v. 37, No. 2, 163–77. [26 refs.]

In this paper, after a review of the literature, the authors make a valiant attempt to answer the question of whether toxoplasm infections of the eye are always congenital or whether they can be acquired in adult life. They make two assumptions: firstly, that the organisms which have been seen in chorioretinal lesions are, in fact, toxoplasms and, secondly, that the dye-test titres which they adopted after proper discussion are specific for toxoplasmosis and indicative of past or present infection. [Not everyone will agree with the assumption of the specificity of the dye test.] Subject to the limitations of the diagnostic methods it is concluded that about

one-quarter of the cases of granulomatous uveal tract disease in adults have a toxoplasm origin. The point is stressed that a diagnosis of toxoplasm infection can be made only by a proper consideration of the clinical picture and the serological findings. *I. A. B. Cathie*

Wagener, H. P. **Toxoplasmic Chorioretinitis in the Adult.** *Amer. J. Med. Sci.* 1955, Feb., v. 229, No. 2, 205–16. [46 refs.]

Giroud, P., Giroud, A. & Martinet, M. Avortements et lésions des embryons chez la rate gestante inoculée avec *Toxoplasma gondii*. [**Abortions and Foetal Lesions in Pregnant Rats inoculated with** *Toxoplasma gondii*] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 4, 505–8, 1 chart & 7 figs. on 2 pls.

A human strain of *Toxoplasma*, isolated in Oubangui, French Equatorial Africa, produced in mice an acute infection with numerous parasites, whereas in rats the infection was symptomless, finally ending in the disappearance of the parasites. In order to study the effect of toxoplasmosis on the offspring of rats, females were inoculated with 0·2 cc. of infected peritoneal exudate between the 1st and 11th days of pregnancy, and sacrificed on the 21st day. During this period the rats manifested no clinical symptoms. It was found that in rats inoculated between the 1st and 6th days, with average litters of 4·9, there were 55 per cent. of abortions. However, in those which were inoculated between the 8th and 11th days, with average litters of 6·8, the number of abortions dropped to 25 per cent. The only lesions observed in the foetuses were certain changes in the lens, including cataracts, which are attributed to toxins produced by the parasites.

These observations on rats throw light on the occurrence of abortions in women with inapparent toxoplasmic infections. [See also this *Bulletin*, 1955, v. 52, 399.] *C. A. Hoare*

Grönroos, P. **Antibiotics and Experimental Toxoplasmosis. II. Erythromycin, Magnamycin, Neomycin and Tebezon in Experimental Toxoplasmosis.** *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1954, v. 32, No. 3, 257–9.

"Erythromycin has a weak effect on experimental toxoplasmosis in embryonated hen's eggs. The effect is not as good as that of sulfa. The chickens, however, remain Toxoplasma carriers. Magnamycin, Neomycin and Tebezon are without effect on toxoplasmosis."

DERMATOLOGY AND FUNGUS DISEASES

Bacon, D. F. & Marples, M. J. **Researches in Western Samoa. II. Lesions of the Skin and their Bacteriology.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 76–81.

[An abstract of this paper appeared in the *Bulletin of Hygiene*, 1955, v. 30, 394.]

Csillag, A. & Brandstein, L. **The Role of a *Blastomyces* in the Aetiology of Interstitial Plasmocytic Pneumonia of the Premature Infant.** *Acta Microbiologica.* Budapest. 1954, v. 2, Nos. 1/2, 179–90, 1 fig. [31 refs.]

Interstitial plasmocytic pneumonia of the premature infant is not uncommon in Hungary and other parts of Central Europe. The aetiology of the disease is not known but bodies seen in the lesions and assumed to be of protozoal nature (*Pneumocystis carinii*) have been regarded as its probable microbic cause. On the other hand, some observers have suggested that the disease is a mycosis and, in this connexion, it is noteworthy that *Candida albicans* has been isolated from the affected lungs. The present authors support the mycotic hypothesis but do not accept *C. albicans* as the fungus concerned. Instead, they attribute the disease to infection by a species of *Saccharomyces* which produces asci having a variable number of ascospores up to 8. They consider that the protozoon-like bodies seen in the pulmonary lesions are, in fact, the octosporous asci of this fungus.

Experimental inoculation by insufflation into mice with a culture of the fungus caused pulmonary lesions similar to those seen in the premature infants, and in these lesions the octosporous asci were easily distinguished. Similar effects could not be obtained by insufflation of *C. albicans* or of saprophytic species of *Saccharomyces*. The fungus was constantly recovered by retroculture from the infected mice.

As to the probable source of the fungus, it was not found in the maternal vagina, which frequently harbours *C. albicans*, but plates of culture media exposed to the air of the premature infants' ward showed that the *Saccharomyces* was " present in large quantities " in the air of the room.

Data are given on the experimental work on mice and on the authors' examination of the fungus, from which it is concluded that " a reliable and accurate classification will be possible only on the basis of careful genetical studies ". *J. T. Duncan*

Downing, J. G. & Folan, D. W., Jr. **An Unusual Case of Cutaneous Blastomycosis.** *New England J. of Med.* 1955, Jan. 20, v. 252, No. 3, 103–4, 2 figs.

" An unusual and rare case of cutaneous re-infection with *Blastomyces dermatitidis* after a twenty-two-year interval is reported. This reinfection responded promptly to the use of iodides."

Matsumoto, K. K., Amatuzio, D. S., Lomasney, T. L., Ayres, W. W. & Cuttle, T. D. **North American Blastomycosis treated with Pulmonary Resection and Stilbamidine.** *Amer. J. Med. Sci.* 1955, Feb., v. 229, No. 2, 172–9, 5 figs. [13 refs.]

" A report is presented of a case of pulmonary blastomycosis discovered in a serviceman in the Far East.

" The disease is presumed to have been contracted in the United States, becoming clinically manifest only after he had been in the Far East for 7 months. Indirect evidence leads one to conclude that the incubation period for the disease in this particular patient was at least 7 months and at most 21 or more months following exposure to the organism.

" The pulmonary lesion was resected for diagnostic and incidental therapeutic purposes, and when the nature of the lesion became known, the patient was treated with a total of 4·3 gm. of stilbamidine isethionate given in two courses.

" One episode of an immediate toxic reaction to stilbamidine was observed during the first course of treatment, presumably due to the too rapid administration of the drug.

" Evidence of renal tubular damage was noted in previously normal functioning kidneys following the second course of stilbamidine.

" To date, 3 months after the first course of the drug was completed, no evidence of trigeminal neuropathy has yet developed."

Cardona, A. & Velázquez, T. Infección del sistema nervioso central por *Coccidioides immitis*. (Estudio de un caso con necropsia.) [*C. immitis* **Infection of the Nervous System; Post-Mortem Findings**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Sept., v. 14, No. 3, 179–88, 7 figs. [18 refs.]

The English summary appended to the paper is as follows:—

" The first case of infecton of the central nervous system with *Coccidioides immitis* recorded in Mexico is described; the patient, an adult male, became infected probably while living in the south of the United States of America."

Hyde, L. **Recurrence of Coccidioidal Cavity following Resectional Surgery.** *Amer. Rev. Tuberculosis.* 1955, Jan., v. 71, No. 1, 131–6, 6 figs. [10 refs.]

" A case is reported of a patient who had a segmental resection for a cystic lung lesion which proved to be a coccidioidal cavity. Follow-up examination revealed a new cavity in the ipsilateral lung, which was asymptomatic and cleared without therapy.

" Although some observers believe that excisional surgery is necessary in many cases of pulmonary cavitary coccidioidomycosis, others incline to the view that surgery is indicated only infrequently.

" The present writer believes that a coccidioidal pulmonary cavity seldom requires any therapy other than reassurance of the patient. The cavity is not usually dangerous for the patient or for others. The greatest danger probably is iatrogenic disability."

Creitz, J. & Harris, H. W. **Isolation of *Allescheria boydii* from Sputum.** *Amer. Rev. Tuberculosis.* 1955, Jan., v. 71, No. 1, 126–30, 4 figs.

" A case of chronic pulmonary disease has been reported in which *Allescheria boydii* was isolated from the sputum. This is the first known instance of recovery of this fungus in association with lung disease."

TROPICAL OPHTHALMOLOGY

Poleff, L. État actuel des principaux problèmes de trachomatologie expérimentale. [**Current Problems in Experimental Trachoma Research**] *Rev. Internat. du Trachome.* 1954, v. 31, No. 4, 434–83, 5 coloured figs. on 2 pls. & 1 text fig. [Numerous refs.]

The English summary appended to the paper is as follows:—

" The cultivability of the corpuscular elements of inclusion of P-H is at present unquestionable. The specific virulence of the isolated strains has been proved on the human conjunctiva. The last doubts concerning the part played by inclusion bodies of P-H in the etiology of trachoma are

definitely dispelled and a valuable method for further investigation in experimental trachomatology is thus created.

" The well known polymorphism of the trachoma bodies has been confirmed and the existence—beside the classical perinuclear inclusions of P-H of rickettsoid corpuscles scattered through the whole cell, as well as of diverse extracellular shapes (free initial and elementary bodies, plastillas), has been definitely proved. This pleomorphism of the virus of trachoma is a function of the vital cycle, which may be observed as well in the infected eye, as in cultures of tissues and in an embryonated egg, inoculated with this virus. According to its morpho-biological properties the agent of trachoma belongs to a group of ultra-viruses (Rickettsiales), intermediate between typical viruses and rickettsias, but coming closer to this last group. It will be therefore convenient to give to this ultra-virus the appellation of ' *Pararickettsia Trachomatis* ', rather than the name of ' *Chlamydozoon* ', based upon a non-constant characteristic of secondary importance (chlamus).

" The affirmation that every case of trachoma necessarily displays in the beginning acute inflammatory symptoms and must be characterised as acute trachoma—is not exact. The trachoma is in fact a chronic disease, although liable—under the influence of certain factors leading to the aggravation of the case—to go through an acute period.

" As regards the connection existing between *Trachoma* and *Paratrachoma*, this problem, in spite of the numerous experimentations of considerable value performed on Man, must, on the whole, be considered as still unsolved from the theoretic point of view, while clinically the difference between the two affections seems to be unquestionable.

" There is little probability of immunity after trachoma, although local formation of anti-bodies during the course of the disease is not excluded. The cure from trachoma does not necessarily involve any assurance against a new contamination. It is, however, possible to obtain by repeated contaminations or by application of virus, previously weakened by some of the existing means (culture *in vitro* and *in ovo*, passage through the lip, fixed animal virus)—a certain degree of local resistance to inoculation by virulent trachomatose material. This local resistance bears evident features of the ' premunition ' and the convenient virus-vaccine may be equally used as a medication.

" Regarding the prophylactic measures—considerable results could be checked lately, owing to a wide application of the principle of decentralization in the action against the trachoma. In the same time, prophylactic measures against microbian ocular infections, preparing the ground for trachoma, were intensified and modern medications were distributed in massive amounts. These measures which efficiency is doubtless—were undertaken in a rather empirical way and lack as yet strictly scientific and experimental bases in the Pasteur conception of epidemiology, especially the biological study of the pathogenic agent in pure culture, research concerning immunization, vaccination, and eventually, sero-therapeutics etc. This can be explained by lack of specialized laboratories and insufficient international coordination of the research upon trachoma, as a social and worldspread disease."

Radovanovitch, M. Étude comparative de différentes méthodes de coloration des corps du trachome. [**Comparative Study of Different Staining Methods of Trachomatous Bodies**] *Rev. Internat. du Trachome.* 1954, v. 31, No. 4, 513–19.

The English summary appended to the paper is as follows:—

" Comparative study of Nataf's, Lestoquard's, Renoux's, Poleff's,

Lindner's and Brand's staining methods for the choice of the most convenient for a campaign against trachoma.

"The best methods seem to be: for rapid investigations Poleff's (acid-blue methylene) and for scientific research Nataf's and Lestoquard's (Giemsa-May-Grünwald)."

PAQUE, A. & DULIERE, L. Essais de traitement du trachôme par la pommade à l'auréomycine en milieu scolaire marocain. [**Attempts to treat Trachoma in Moroccan Schoolchildren with Aureomycin Ointment**] *Bull. Inst. Hyg. Maroc.* 1953, v. 13, Nos. 3/4, 175–212, 6 graphs. [38 refs.]

The authors carried out experiments on the treatment of trachoma with aureomycin ointment in Moroccan high-school boys; 4,000 were examined, and of these 1,800 were suffering from trachoma in different stages. The ointment was applied for a month and the cases were then re-examined. The authors formed the following conclusions:—

1. Treatment with aureomycin ointment produces good results in the initial and pre-cicatricial stages of trachoma, but in the florid types of the disease the results are unsatisfactory except in a small proportion of cases.
2. Differences in concentration of the ointment (1–3 per cent.) and in the number of daily applications (2–3) did not appear to alter the results, which were checked 6 months after the treatment was stopped.
3. The addition of oral sulphonamides, and of 1 per cent. copper sulphate drops, to the treatment with aureomycin ointment did not produce better results.
4. The treatment with aureomycin ointment is simple and students can be easily taught the method of application and in turn can apply it to other members of their family. *E. W. O'G. Kirwan*

BIERENT, P. Les traitements associés du trachome. [**Associated Treatment of Trachoma**] *Rev. Internat. du Trachome.* 1954, v. 31, No. 4, 498–512.

RADOVANOVITCH, M. L'organisation et les résultats de la lutte contre le trachome en Servie 1948–1952. [**Organization and Results of the Campaign against Trachoma in Serbia (1948–1952)**] *Rev. Internat. du Trachome.* 1954, v. 31, No. 4, 526–32, 2 figs.

The English summary appended to the paper is as follows:—

"Trachoma is endemic in the states of Voivodina and Podrigne of the Servian Republic.

"From 1948 to 1951 1,644,219 people have been examined, say 88·9% of the population. The examinations have been carried out in the villages and houses.

"50,555 trachomatous, say 3·7% have been found. Following the spreading, the distribution of the disease and the infected states, 10 dispensaries and 180 posts have been created during the period 1948–52, 11,298 patients have been healed and regularly surveyed."

See also p. 546, LOWE, **Leprous Affection of the Eyes.**

TROPICAL ULCER

ZIPRKOWSKI, L., REIN, C. R. & KITCHEN, D. K. **Treatment of Tropical Ulcer. Single Injection of Penicillin Procaine in Oil and Aluminum Monostearate (PAM).** *Arch. Dermat.* 1955, Jan., v. 71, No. 1, 120–22.

The authors discuss briefly the nature and incidence of tropical ulcer of the fuso-spirochaetal type, and refer to its treatment and especially treatment by various antibiotics: they quote relevant literature, with which readers of this *Bulletin* will be familiar.

They then give a short account of the treatment, in Israel, of 14 out-patients by means of a single injection of 1,200,000 units of penicillin procaine in oil and aluminium monostearate (PAM). The patients, although ambulant, were kept in the same environment and under the same conditions in which they had been before treatment. The only local treatment used consisted of saline dressings.

The PAM used was supplied in 10 ml. vials, each containing 6,000,000 units of penicillin.

In every case, ulcers became covered with healthy granulation tissue after one week and had healed almost completely in 10 days. Two cases are described briefly, but they appear to have had twice the dose, namely 4 cc. = 2,400,000 units.

The authors had previously treated similar cases with bismuth subgallate (Dermatol powder) or 3 per cent. aureomycin ointment, but had found that 4 to 8 weeks were required for healing. *H. J. O'D. Burke-Gaffney*

MISCELLANEOUS DISEASES

EL GAZAYERLI, M. & KHALIL, H. A. **Observations on Diseases of the Appendix.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 9, 1086–92, 2 figs. on pl. [23 refs.]

"1. The sex and age incidences of acute appendicitis in Egypt are similar to those reported from other countries.

"2. *Enterobius vermicularis* is responsible for a fair number of cases of catarrhal appendicitis.

"3. Obstruction is an important factor in deciding the type and severity of the acute inflammatory reaction, and in Egypt obstruction may be caused by a healed bilharzial lesion.

"4. The fibrous tissue formation which occurs in chronic bilharzial infiltration of the appendix does not hinder the spread of the septic process to the outer coats of the appendix. This finding is contrary to the results obtained by other authorities.

"5. Acute pyogenic infection is the most common lesion occurring in the vermiform appendix.

"6. Tuberculosis, carcinoid, etc. must be considered as rarities.

"7. On the basis of the above study, we are forced to agree with the group of authors who hesitate to give the appendicular infestation any importance in the production of appendicitis."

See also p. 563, Deschiens & Floch, Incidence de l'A.C.T.H. sur les hyperéosinophilies parasitaires de l'enfant. [**Effect of Corticotrophin on Parasitic Eosinophilia in Children**]

PARASITOLOGY: GENERAL

Baar, H. S. **Interstitial Plasmacellular Pneumonia due to** *Pneumocystis carinii*. *J. Clin. Path.* 1955, Feb., v. 8, No. 1, 19–24, 5 figs. [29 refs.]

"A case of interstitial plasmacellular pneumonia is described—the first to be reported outside the European continent. The finding of characteristic honeycombed masses in the air spaces, which were identified by Vaněk and Jírovec as the protozoon *Pneumocystis carinii*, is confirmed. Histochemical reactions of the honeycombed masses are reported. The case was associated with cytomegalic inclusions of salivary glands, and the significance of this association is discussed."

Carlgren, L. E. & Nathorst-Windahl, G. Interstitiell plasmocellulär pneumoni hos spädbarn med förekomst av *Pneumocystis carinii*. [**Interstitial Plasmocellular Pneumonia associated with the Parasite** *Pneumocystis carinii* **in Infants**] *Nordisk Med.* 1955, Feb. 3, v. 53, No. 5, 198–201, 5 figs. [22 refs.]

The English summary appended to the paper is as follows:—
"An endemic of 5 cases of interstitial plasmocellular pneumonia is reported. Three patients died, and autopsy showed typical pathological changes and in each case the parasite *Pneumocystis carinii* was found."

Navrátil, B., Šmíd, Z. & Bárta, K. Klinicko-serologický rozbor interstitiálních pneumocystových pneumonií u kojenců. [**The Clinical and Serological Analysis of Interstitial Pneumocystis Pneumonias in Infants**] *Časopis Lékařů Českých*. Prague. 1955, Jan. 7, v. 94, Nos. 1/2, 7–8.

In complement-fixation tests with an acetone-alcohol extract of dried lungs infected with *Pneumocystis carinii*, carried out on sera from 45 premature and 12 full-term infants suffering from suspected *Pneumocystis* pneumonia, a positive result was obtained in 47 instances (82·4 per cent.), in all of 21 cases which proved fatal, and in 26 of 36 infants who survived (72 per cent.). *D. J. Bauer*

Bárta, K. Pokusná problematika pneumocystových pneumonií. [**The Problem of Experimental Pneumocystis Pneumonias**] *Časopis Lékařů Českých*. Prague. 1955, Jan. 7, v. 94, Nos. 1/2, 5–7. [31 refs.]

Attempts to infect rats, mice, guineapigs and rabbits with *Pneumocystis* by the oral administration of lung tissue from a child who had died of *Pneumocystis* pneumonia were unsuccessful, and the infection could not be established by placing the animals on a vitamin-deficient diet, or by giving

the material by intranasal or intraperitoneal routes. It was concluded that rodents do not participate in the cycle of infection. *D. J. Bauer*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Jones, J. C. **On the Heart in relation to Circulation of Hemocytes in Insects.** Reprinted from *Ann. Entom. Soc. of America.* 1953, Sept., v. 46, No. 3, 366–72, 4 figs. [21 refs.]

Hamon, J. Contribution à l'étude des culicidés de la région de Bobo Dioulasso (Haute-Volta). [**Study of the Culicidae of Bobo Dioulasso, Upper Volta**] *Ann. Parasit. Humaine et Comparée.* 1954, v. 29, Nos. 5/6, 573–87, 5 figs.

Hamon, J. Contribution à l'étude des culicidés de la région de Porto Novo (Bas-Dahomey). [**Study of the Culicidae of Porto Novo, Upper Dahomey**] *Ann. Parasit. Humaine et Comparée.* 1954, v. 29, Nos. 5/6, 588–94, 6 figs.

Kershaw, W. E., Chalmers, T. A. & Lavoipierre, M. M. J. **Studies on Arthropod Survival. I.—The Pattern of Mosquito Survival in Laboratory Conditions.** *Ann. Trop. Med. & Parasit.* 1954, Dec. v. 48, No. 4, 442–50, 9 figs. [10 refs.]

The authors are interested in the vital statistics of biting insects, particularly in the relation between age and rate of mortality. In earlier papers [this *Bulletin*, 1954, v. 51, 83; 1955, v. 52, 186] they showed that the rate of mortality in *Aëdes aegypti* and *Chrysops* spp. increases with age. Macdonald, on the other hand [*ibid.*, 1952, v. 49, 569] concluded that in wild mosquitoes the rate is not changed by the age of the insects.

In this paper it is shown that, under laboratory conditions, survival has a similar pattern in several species of *Anopheles* and in *Aëdes aegypti*. When survival is plotted logarithmetically against age the curve is smooth and indicates an increase of mortality with age: log. mortality is directly proportional to age (*i.e.*, the Gompertz function [*ibid.*, 1954, v. 51, 83] then appears as a straight line).

The general pattern of survival has similar features in males and females, the former living a much shorter period. *P. A. Buxton*

Wallis, R. C. **The Effect of Population Density and of NaCl Concentrations in Test Series in Laboratory Experiments with Ovipositing** *Aedes aegypti*. *Mosquito News.* 1954, Dec., v. 14, No. 4, 200–204.

In the first series of experiments female *Aëdes aegypti*, in successive groups of 2 to 350, were offered sodium chloride solutions of 0 per cent.

(distilled water) to 3·0 per cent. in which to oviposit. In each case the 0·25 per cent. solution received the maximum number of eggs and the only effect of increasing the number of mosquitoes was slightly to extend the range of concentrations.

It was then shown that if the range of concentrations offered was varied a misleading interpretation of results could take place. Thus if distilled water was offered together with 0·125 per cent. sodium chloride no discrimination was made; if distilled water was offered together with 1·0 per cent., 2 per cent. and 3 per cent. solutions, then distilled water received the maximum number of eggs; but if the intermediate concentrations in the range were offered. *i.e.*, 0 per cent., 0·25 per cent., 0·5 per cent., 0·75 per cent., 1·0 per cent., 1·5 per cent. and 2 per cent., it was found that 0·25 per cent. salinity was preferred.

The degree of sensitivity shown in this selection suggests contact rather than general chemosensitivity. *Anne Hudson*

Senevet, G. & Andarelli, L. Présence de *Aedes punctor* Kirby, 1837, en Algérie. [**Presence of** *Aëdes punctor* **in Algeria**] *Arch. Inst. Pasteur d'Algérie.* 1954, Dec., v. 32, No. 4, 309.

Laven, H. & Kitzmiller, J. B. Kreuzungsversuche zwischen europäischen und amerikanischen Formen des *Culex-pipiens*-Komplexes. [**Crossing Experiments between European and American Forms of the** *Culex pipiens* **Complex**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, July, v. 5, No. 3, 317–23.

Crossing experiments have been carried out between 3 European forms of *Culex molestus*, from North, South and West Germany, and *Culex fatigans* from California and *Culex pipiens* from Illinois.

Reciprocal crosses between United States *pipiens* and *fatigans* have been shown to produce fertile offspring. Some crossings are shown to be possible between the United States *pipiens* and the European *molestus*, forms which are morphologically similar but show considerable physiological differences. Some are possible between European *molestus* and United States *fatigans*, morphologically different, but with some physiological similarity.

There are, apparently, at least 8 different groups of *molestus* populations, some of which are genetically isolated and some correlated by a strictly unilateral flow of genes. *Anne Hudson*

Hamon, J. Contribution à l'étude des culicides d'Afrique Occidentale. Description de *Uranotaenia devemyi* sp. n., *Culex grahami* var. *farakoensis* var. n. et de la larve de *Harpagomyia trichorostris* Theobald. [**Study of Mosquitoes of West Africa;** *Uranotaenia devemyi*, *Culex grahami*, **var.** *farakoensis* **and the Larvae of** *Harpagomyia trichorostris*] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 5, 672–8, 3 figs.

Rajindar Pal & Sharma, M. I. D. **Control of Culicine Mosquitoes with Synthetic Insecticides.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1954, May, v. 2, No. 3, 117–22. [Numerous refs.]

A review of the literature.

Sharma, M. I. D. **Factors influencing the Toxicity of Residual Insecticides against Mosquitoes.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1954, May, v. 2, No. 3, 110–16. [36 refs.]

A review of the literature.

Afridi, M. K., Husain, M. Z. Y., Naqvi, S. H. & Abdul Majid. **A Simple Biological Method of testing the Toxicity of Residual Insecticides.** *Indian J. Malariology.* 1954, Sept., v. 8, No. 3, 229–34, 4 figs. on 2 pls.

This method is used at the Malaria Institute of Pakistan, Karachi, for testing the toxicity of insecticides against mosquitoes. The outside and inside surfaces of the laboratory wall are marked off with experimental areas a foot square and 4 feet above the ground or floor. These areas are plastered with mud, lime wash, cow-dung, etc. or covered with thatch, matting, bamboo, wood or other local building material. The prepared square is sprayed with the insecticide to be tested; if a strong wind is blowing when testing is being done outside, a wooden frame 6 inches deep is placed around the square to prevent drift.

Mosquito exposure chambers are ordinary glass funnels 3 or 5 inches in diameter with their stems cut off; one of these is held against the sprayed surface by rubber straps. Mosquitoes are introduced into the funnel and the time is noted. When a pre-arranged proportion of the mosquitoes are knocked down the time is again recorded and the insects are transferred to clean lantern chimneys resting on damp lint; glucose solution or raisins are provided as food. After 24 hours the mortality count is made and recorded.

Several trials of this method were made and the results of some of them are given. Against local anophelines DDT at 1 gm. per square metre on lime plaster on cement had a longer residual effect than BHC applied at the rate of 0·1 gm. per square metre; the knock-down effect of BHC was more rapid; suspensions were superior to solutions and emulsions. In a test on various surfaces BHC was apparently more effective on absorbent surfaces than on non-absorbent, whereas DDT had the opposite tendency. Culicines proved refractory to DDT but BHC was fairly effective against them. Because of this, BHC was mixed with DDT to make a general insecticide. *H. S. Leeson*

Oliver, A. D. & Eden, W. G. **Toxicity of Several Insecticides to Two Strains of the House Fly.** *J. Econom. Entom.* 1955, Feb., v. 48, No. 1, 111.

"The susceptibilities of two strains of the adult house fly, *Musca domestica* L., to five insecticides were determined by topical application. The LD-50's in micrograms per fly of the insecticides to the non-resistant (Orlando) and resistant (Auburn) strains were, respectively, as follows: TEPP, 0·19 and 0·24; DDT, 0·45 and 6·40; lindane, 0·75 and 1·25; malathion, 0·87 and 1·07; and endrin, 1·90 and 2·10."

Cunningham, H. B. & Eden, W. G. **Toxicity of Several Insecticides to House Fly Larvae.** *J. Econom. Entom.* 1955, Feb., v. 48, No. 1, 109–10.

"Laboratory experiments were conducted to determine the LD-50 concentrations of endrin, aldrin, dieldrin, chlordane, and DDT in the larval

medium to third-instar house fly larvae. The emergence of adult flies was used as a measure of toxicity. Endrin was the most toxic with an LD-50 concentration of 125 p.p.m. in the medium. The LD-50 concentrations of aldrin, dieldrin, chlordane, and DDT were 430, 450, 1450, and 2300 p.p.m., respectively."

Grandori, L., Reali, G. & Facetti, D. Effetti narcotici dell'etiluretano sulla mosca domestica adulta. [**Narcotic Effects of Ethyl Urethane on Adult House-Flies**] *Boll. Zool. agr. Bachic.* Milan. 1952, v. 18, Fasc. 1, 3–10. English summary.

———— & Facetti, D. Ulteriore sperimentazione sugli effetti dell'etiluretano sulla mosca domestica adulta. [**Further Experiments on the Effects of Ethyl Urethane on Adult House-Flies**] *Ibid.*, 21–8. English summary.

Gladenko, I. N. & Fortushnyĭ, V. A. [**The Control of Blood-Sucking Diptera by the Method of Aviodusting the Biotopes with Contact Poisons**] *Veterinariya.* Moscow. 1953, v. 30, No. 3, 37–40. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1954, Dec., v. 42, Pt. 12, 179–80.]

The experiments described were carried out in July 1949 and June–July 1950 in an area of about 12 sq. miles in the region of the Dnieper reed-beds to test the possibility of controlling blood-sucking Diptera (mosquitoes, Tabanids and Ceratopogonids) by dusting their shelters and breeding places from an aeroplane. The plots selected included pools, swamps and areas covered with reeds, shrubs or trees, and the results were estimated by daily counts of the Diptera that settled on horses in neighbouring meadows and by catches of mosquitoes in or near the vegetation. The dusts used contained 6 or 10 per cent. DDT or 12 per cent. BHC.

DDT in talc was used in 1949, and as a preliminary test showed that a rate of 4·5 lb. dust per acre was insufficient to give satisfactory coverage of vegetation, though it was sufficient for water surfaces, rates of 9 and 18 lb. per acre were used. The dust adhered well to the foliage when applied at 9 lb. per acre in the early morning to plants wet with dew and was not washed off by light rain. The results showed that the numbers of Diptera were greatly reduced for four days after dusting and then increased again. When the treatment was repeated, the reduction of Tabanids was still greater and they did not increase again during the observations.

In 1950, BHC was tested in addition to DDT. Clay was used as the carrier, and adhesion to the foliage was less good. DDT dust at 9 lb. per acre caused sharp reductions in population of Diptera and there was no increase for ten days. A second treatment at 18 lb. per acre reduced Tabanids to a minimum, and few were observed throughout the rest of the period. Mosquitoes almost disappeared for 4–5 days after treatment with 10 per cent. DDT at 18 lb. per acre and then became as numerous as before. BHC gave analogous results; the numbers of Diptera were greatly reduced for five days after dusting at 9 lb. per acre, and Tabanids were almost eliminated for ten days when the rate was 18 lb. per acre. Treatment of water surfaces with less concentrated dusts at rates giving about 3·6–4·3 oz. actual DDT or BHC per acre killed Anopheline larvae, and both chemicals at 4·3 oz. also killed the larvae of other mosquitoes. First-instar larvae were observed after treatment on a few occasions, owing to sinking of the dust

before they hatched. Treatments at much higher rates were shown to be harmless to fish.

Pimentel, D. **Relationship of Ants to Fly Control in Puerto Rico.** *J. Econom. Entom.* 1955, Feb., v. 48, No. 1, 28–30.

"The ecological relationship of ants to the suppression of populations of *Musca domestica*, *Phaenicia* spp., *Callitroga macellaria*, and *Sarcophaga* spp. in Puerto Rico was studied. Under fly breeding conditions simulating those found in garbage cans in urban areas, ants destroyed 91 per cent of the potential fly population between the egg and adult stages. The fire ant, *Solenopsis geminata*, was the most important ant in the biological control of house flies, accounting for the majority of the flies destroyed. *Paratrechina longicornis*, *Solenopsis corticalis*, *Tapinoma melanocephalum*, and *Pheidole subarmata borinquensis* also killed some flies. Observations on the biology of *S. geminata*, *P. longicornis*, *S. corticalis*, *T. melanocephalum*, and *P. subarmata* were recorded."

Harant, H., Huttel, W. & Dautheribes, F. A. A propos d'une entéromyiase à *Fannia*. [**Enteromyiasis caused by** *Fannia*] *Ann. Parasit. Humaine et Comparée*. 1954, v. 29, Nos. 5/6, 568–72.

The authors record the recovery of larvae of *Fannia incisurata* from the intestine of a man aged 36.

Previous cases of intestinal parasitism by Anthomyids are cited and a list is given of other Diptera the larvae of which have been reported from the human intestinal system.

The reason given for drawing attention to this particular case is that the man had a long history of gastric trouble (which is related) and it is thought that this abnormal condition may have favoured the establishment of the temporary parasitism, whereas in a normally healthy person any young larvae accidentally ingested would be immediately destroyed.

H. S. Leeson

Mackerras, I. M. **The Classification and Distribution of Tabanidae (Diptera). I. General Review.** *Australian J. Zool.* 1954, Nov., v. 2, No. 3, 431–54, 10 figs. [21 refs.]

Roback, S. S. **The Evolution and Taxonomy of the Sarcophaginae (Diptera, Sarcophagidae).** *Illinois Biol. Monog.* 1954, v. 23, Nos. 3/4, 181 pp., 9 charts, 1 text fig. & 460 figs. on 34 pls. [Numerous refs.]

Feldman-Muhsam, B. **Revision of the Genus** *Hyalomma*. **I. Description of Koch's Types.** *Bull. Res. Counc. of Israel.* 1954, Sept., v. 4, No. 2, 150–70, 15 figs. (6 on 2 pls.). [31 refs.]

Vargas, L. Nuevo registro de pulgas mexicanas (Insecta, Siphonaptera). [**A New Register of Mexican Fleas**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Sept., v. 14, No. 3, 155–61. [14 refs.]

The English summary appended to the paper is as follows:—

"The increasing interest in the study of the Mexican Fleas is reflected in the number of species recorded so far. The author notes down 83

species, 41 genera, 15 subfamilies and 7 families. Many species have been found only in Mexico."

Lipovsky, L. J. **Studies of the Food Habits of Postlarval Stages of Chiggers (Acarina, Trombiculidae).** *Univ. Kansas Sci. Bull.* 1954, July 15, v. 36, Pt. 2, 943–58. [14 refs.]

"Although some nymphal and adult chiggers feed on quiescent stages of other small arthropods, those of our commonest chiggers utilize eggs of arthropods as their principal food. By offering postlarval chiggers laid eggs or dissected ovarian material of 21 arthropod orders (a total of 162 genera), considerable insight into normal foods was acquired. The Collembola, Diptera, Hemiptera, Homoptera, and Lepidoptera are the large orders which lay eggs attractive to chiggers. The Coleoptera and Orthoptera have relatively unattractive eggs. Certain eggs are toxic, at least when infected with *Penicillium*."

Derrick, E. H. & Womersley, H. **The Scrub-Itch Mite of South-East Queensland.** [Summary.] Reprinted from *Australian J. Sci.* 1954, June, v. 16, No. 6, 238–9, 1 fig.

During a mite survey of the rain forests of south-east Queensland, larvae of mites were collected by the authors from the body of the collectors as well as from white cards laid on the ground in likely places. All the mites collected from man were *Lecuwenhoekia* (*Acomatacarus*) *hirsti*, the scrub-itch mite of south-east Queensland, a species hitherto known only from North Queensland. However, this species comprised only 82 per cent. of the larvae collected from the cards, the rest being composed of various other Trombiculid mites.

The finding of *Neoschöngastia posekanyi* on the cards was of interest, as this species has been previously recorded only from Okinawa. It was noteworthy that among all the mites collected, there was no example of *Trombicula hirsti*, the scrub-itch mite of North Queensland, or of *T. deliensis*, the presumed vector of scrub typhus in North Queensland.

No infective agent was isolated from 3 batches of mites inoculated into suckling mice.

The natural host of *L. hirsti* is not known, but another species of *Leeuwenhoekia* has been collected from bandicoots (*Isoödon obesulus*) near Brisbane. *M. G. R. Varma*

King, W. V. **Chemicals evaluated as Insecticides and Repellents at Orlando, Fla.** *Agric. Handb. U.S. Dept. Agric. No. 69.* 397 pp. 1954. Wash. [$2.25.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1954, Dec., v. 42, Pt. 12, 184–5.]

This report is the summary of the results of tests at the Orlando laboratory of the U.S. Bureau of Entomology and Plant Quarantine of over 11,000 compounds received there prior to July 1952. The compounds are arranged in tables with figures indicating the effectiveness (in one of five categories) attributed to each in respect of the tests carried out with it. Nearly all the compounds were tested as mosquito larvicides and for toxicity, speed of action and ovicidal effect against *Pediculus humanus humanus* L., and large numbers of them as toxicants in space sprays and

deposits against mosquitoes and *Musca domestica* L., in dusts and on cloth against cockroaches and fleas, and on cloth against ticks and larvae of *Trombicula* spp., as repellents on skin and cloth against mosquitoes and on cloth against fleas and ticks, and as synergists with pyrethrum extract against *P. h. humanus*. The species of mosquitoes, fleas and cockroaches used in the tests are given; the tick was *Amblyomma americanum* (L.).

The ways in which the various tests were carried out are described in an introductory section.

Lord, K. A. & Potter, C. **Differences in Esterases from Insect Species: Toxicity of Organo-Phosphorus Compounds and *in vitro* Anti-Esterase Activity.** Reprinted from *J. Sci. Food & Agric.* 1954, Oct., v. 5, No. 10, 490–98. [25 refs.]

——— & ———. **Organo-Phosphorus Insecticides. Insecticidal and Anti-Esterase Activity of Organo-Phosphorus Compounds.** Reprinted from *Chemistry & Indust.* 1954, 1214–17, 3 figs. [18 refs.]

It is generally accepted that the high toxicity of organo-phosphorus compounds to mammals is related to their anticholinesterase action. Their activity against insects is less clear, for it is not known whether acetylcholine has an equivalent rôle in arthropods, though it has been shown to occur in at least one insect.

The authors have conducted experiments with 5 organo-phosphorus insecticides, employing 4 species of insect, to determine whether the toxicity of the insecticides could be related to their anti-esterase activity. The methods are described in some detail. Toxicity to *Tenebrio molitor*, *Blattella germanica* and *Dysdercus fasciatus* was measured by topical application of measured droplets. Data for *Tribolium castaneum* were obtained by spraying tests. Enzyme extracts of whole insects were obtained by maceration in acetone followed by freeze drying. The extracts were further purified to some extent. Enzyme activity was measured by (1) hydrolysis of phenyl acetate (the liberated phenol being estimated colorimetrically); (2) hydrolysis of acetylcholine (the liberated CO_2 being measured in a Warburg respirometer). Inactivation by the phosphorus compounds was measured by adding different concentrations to find the 50 per cent. inhibition level.

The results indicated that two enzymes were present; one hydrolysed phenylacetate but not acetylcholine, the other affected both esters. The former enzyme was most sensitive to inhibition by the organo-phosphorus compounds. A comparison of the data showed no correlation between *in vivo* toxicity and *in vitro* inhibitory powers of these compounds. This is not really surprising because the lethal dose applied externally to an insect can only very indirectly be related to the active concentration at the site of action. Various compounds would differ in their effective diffusion and some are known to be detoxified *en route*. On the other hand, parathion is actually converted into the toxic compound para-oxon, by tissues of plants and animals; thus, its toxicity woud augment by *in vivo* application.

It is not unlikely that anti-esterase activity is related to the insecticidal value of the organo-phosphorus compounds, but the following facts suggest that it is not an anticholinesterase enzyme mainly attacked. (1) Hopf (*Ann. Applied Biol.*, 1952, v. 39, 193) did not find that injections of acetylcholine increased the toxicity of TEPP [ethyl pyrophosphate] to locusts. (2) In the authors' experiments, the enzyme attacking phenylacetate (and not acetylcholine) was the more sensitive to inhibition. (3) The authors have

shown that tomato moth eggs can be killed by TEPP before an organized nervous system has developed. In the young eggs an enzyme capable of hydrolysing phenylacetate is present but acetylcholine is only attacked by extracts from eggs shortly before hatching. *J. R. Busvine*

MISCELLANEOUS PAPERS

VAN RIEL, J. L'environnement tropical. [**The Environment of the Tropics**] *Bruxelles-Méd.* 1954, Dec. 12, v. 34, No. 50, 2449–65.

The author reviews the philosophy and general principles of tropical hygienic development with special reference to the Belgian Congo and for a metropolitan audience. He rejects the attitude that tropical people are sharply distinguished from temperate ones by any important racial characteristic, or by exposure to exotic diseases demanding totally different hygienic systems for their control from those practised elsewhere. Rather they are to be considered as subject to an environment, particularly a climate, which impoverishes the soil and leads to its rapid erosion. In consequence crops are defective, populations widely scattered, and individuals too ill-nourished to cultivate properly such soil as they have. Their condition is aggravated by the parasitism to which they are exposed and the fact that the climate facilitates the transmission of disease, particularly insect-borne. The pattern of disease is different in detail from that in temperate lands but not in principle, the main groups being present in different proportions in the two places. The poverty of the people is aggravated by a primitive civilization, inadequate machinery for government, and ignorance. Europeans are affected by the environment and particularly by the proximity of unhealthy populations.

Hygienic measures carried out alone are doomed to failure and must be combined with economic measures, improved use of soil, the prevention of erosion, the introduction of new crops, the advancement of agriculture and development of agricultural cooperatives and mechanized procedures. The 10-year plan for economic and social development of the Belgian Congo is based on these principles and on the conceptions of equality of the races, respect for the individual, social justice and human brotherhood.

G. Macdonald

DAVID, J. M. S. Contribuição para o estudo da antropologia dos indígenas da Lunda e Songo. [**A Contribution to the Anthropological Study of the People of Lunda and Songo**] *Anais Inst. Med. Trop.* Lisbon. 1953, Dec., v. 10, No. 4, Fasc. 2, 2913–3286, numerous figs. [Numerous refs.] English summary.

SARMENTO, A. Contribuição para o estudo da antropologia dos Bailundos. [**A Contribution to the Anthropological Study of the Bailundos**] *Anais Inst. Med. Trop.* Lisbon. 1953, Dec., v. 10, No. 4, Fasc. 2, 3287–311, 1 map & 14 figs. [17 refs.] English summary (5 lines).

REPORTS AND SURVEYS

FLOCH, H. Rapport sur le fonctionnement technique de l'Institut Pasteur de la Guyane Française et du Territoire de l'Inini pendant l'année 1953. [**Annual Report of the Pasteur Institute of French Guiana and Inini for 1953**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 326.* 1954, 260 pp., 2 figs. [Refs. in footnotes.]

Colonel Floch's annual reports are always full of interest and detailed information and this year's report maintains the standard of its predecessors. It is pleasing to note that the building of the new Institute was well advanced at the end of the year under review and this is illustrated, together with a photograph of the imposing design for these new buildings.

The Director himself attended several conferences including the 6th International Congress of Leprology in Madrid, where he was a member of the French delegation and on which he reports at some length; he also adds observations on leprosy in Spain and Portugal.

It is noted that at the Institute itself, 53,340 routine examinations were done of which 35,405 were entomological. The usual notes on routine and research work are provided and the latter is shown under no less than 36 headings. The work on leprosy and malaria, recorded at length, is well-known and indeed most of the principal subjects treated will be familiar to readers of this *Bulletin*. There is an interesting and useful section of 15 pages devoted to nutritional standards for French Guiana, with many supporting Tables, and a short account of immigration in the Territory.

No less than 76 publications are listed, 36 being in the *Archives* of the Institute and the remainder in general and special medical journals.

H. J. O'D. Burke-Gaffney

Printed in Great Britain under the authority of HER MAJESTY'S STATIONERY OFFICE
by The Eastern Press, Ltd., London and Reading.

(1790) Wt. P8525/461 5/55 E.P. Ltd. Gp. 566

ALPHABETICAL LIST OF AUTHORS OR SOURCES

Afridi, M. K., Husain, M. Z. Y., Naqvi, S. H. & Abdul Majid, 586
Ahmad, N. & Purshottam, N., (533)
Ahumada, M., Molina Pasquel, C. & Mazzotti, L., 556
Aksoy, M., 571
Allegra, G. & Niutta, R., 540
Andrews, J. M., Grant, J. S. & Fritz, R. F., 512
Angel Espinoza, L., 519
Annecke, D. H. S., 513
Arduino, L. J., 572
Asakura, S. & Sasamura, M., (559)
Autret, M. & Behar, M., (567)

Baar, H. S., 583
Backhouse, T C. & Woodhill, A. R., 561
Bacon, D. F. & Marples, M. J., (577)
Barclay, S., (557)
Barrios, H., 538
Bárta, K., 588
Bertram, D. S., 520
Beutler, E., Dern, R. J. & Alving, A. S., 510
Beverley, J. K. A., Skipper, E. & Marshall, S. C., 575
Bibawi, E., Mahfouz, M. M. & Massouda, B., 552
Bierent, P., (581)
Black, R. H., 505
Black, R. L., Terry, L. L. & Spicknall, C. G., 539
Blumenthal, H., Michaelson, J. B., De-Lamater, J. N. & Rennie, P. J., 536
Boyd, J. S. K., 520
Bras, G. & Clearkin, K. P., 503
Bray, R. S., 508
Bull. World Health Organization, 510
Bunde, C. A., Blair, H. E., Burch, G. R. & Lee, J. W., 560
Burgdorfer, W., 542

Calero M., C., 538
Camera, A. & Russo, N., 574
Cardona, A. & Velázquez, T., 579
Carlgren, L. E. & Nathorst-Windahl, G., 583
Carrescia, P. M. & Negroni, G., 516
Cathie, I. A. B., 576
Charles, L. J., 564
Chaussinand, R., Viette, M. & Krug, O., 549
Corkill, N. L., 567
Corradetti, A., Tentori, L. & Verolini, F., 516
Coutinho, J. O., Croce, J., Campos, R., Amato Neto, V. & Fonseca, L. C., 558
Creitz, J. & Harris, H. W., 579
Csillag, A. & Brandstein, L., 578
Cunningham, H. B. & Eden, W. G., 586

David, J. M. S., (591)
Dern, R. J., Beutler, E. & Alving, A. S., 509
Derrick, E. H. & Womersley, H., 589
Deschiens, R. & Floch, H., 563
Dharmendra & Chatterjee, K. R., 548
—— & Sen, N. R., 547
Dias, C. B., Borrotchin, M. & da Silva, J. R., 554
Downing, J. G. & Folan, D. W., Jr., 578
Dutta, C. P., Pradhan, J. & Bhattacharjee, S. K., 507
Dy, F. J., 511

Ejercito, A., Hess, A. D. & Willard, A., 513
El-Dewi, S., Aziz, S. & Bebawi, E., 573

Faiguenbaum, J. & Alba, M., 541
Fairbairn, D., (559)
Farid, M. A., 511
Farinaud, M.-E. & Choumara, R., 512
Feldman-Muhsam, B., (588)
Fernandez, J. M. M., Appel, B. & Dougherty, E., 547
de Filippis, V., 527
Finckh, E. S., 575
Floch, H., 511, 514, 562, 592
Fukushima, K., Senda, N., Ishigami, S., Ishii, M., Tamai, Y., Murakami, Y. & Nishian, K., 570

Garduño, D. M. & Icasiano, C. B., (556)
Garnham, P. C. C., 520
Garrett-Jones, C. & Gramiccia, G., 512
el Gazayerli, M. & Khalil, H. A., 582
Gehr, E., 545
Georgopoulos, G. D., 512
Giglioli, G., 512
Gillette, H. P. S., 513
Giroud, P., Giroud, A. & Martinet, M., 577
Gladenko, I. N. & Fortushnyĭ, V. A., 587
Grandori, L. & Facetti, D., (587)
——, Reali, G. & Facetti, D., (587)
Grasset, E. & Schwartz, D. E., 574
Greenberg, J., Taylor, D. Jane & Trembley, Helen L., 517
—— & Trembley, Helen L., 517
Grönroos, P., 577
Gross, Ruth T., Kriss, J. P. & Spaet, T. H., 573
Gunther, C. E. M., 507
das Gupta, C. R., 570

Haedicke, T. A. & Jones, B., 542
Haex, A. J. C. & Lips, J. B., 569
Halawani, A. & Latif, N., 555
Hamashima, Y., (566) *bis*
Hamon, J., (584) *bis*, (585)
—— & Dufour, G., 511
Hanks, J. H., 543
—— & Gray, C. T., 543
Harant, H., Huttel, W. & Dautheribes, F. A., 588
Heisch, R. B., 520 *bis*, 522
Henion, W. F., Mansour, T. E. & Bueding, E., 551
Hernandez de la Portilla, R., Becerra, E. & Ruiloba, J., 539
Hewitt, R. I., Gumble, A. R., Wallace, W. S. & Williams, J. H., 518
Hoare, C. A., 520
Horwitz, Eliana, Artigas, J. & Silva, R., 535
Hyde, L., 579

Ishii, N., Nakayama, A. & Ishii, Y., 531

Jacob, G. F., 572
Jaswant Singh, Nair, C. P. & Ray, A. P., 514
Jaujou, C. M. J., 511
Jelliffe, D. B., Bras, G. & Stuart, K. L., 568
Jones, J. C., (506), (584)

Kanakaraj, J. D., (548)
Kershaw, W. E., Chalmers, T. A. & Lavoipierre, M. M. J., 584
King, B. A., 553
King, W. V., 589
Koppisch, E., 553
Krishnan, K. S., (506)
Kruglick, J. S., 533

Lartigaut & Lartigaut, Denise, 530
Latyshev, N. I. & Kryukova, A. P., 522
Laven, H. & Kitzmiller, J. B., 585
Lawless, D. K., 537
Learmonth, A. T. A., 535
Lichtenberg, F. & Lindenberg, M., 551
Lipovsky, L. J., 589
Lippi, M. & Tucci, A., 548
Lord, K. A. & Potter, C., 590 *bis*
Lowe, J., 544, 546

MacArthur, W. P., 524
MacCallum, F. O., 526
McFadzean, J. A., 560
Mackerras, I. M., (588)
Mackerras, M. Josephine & Sandars, Dorothea F., 506
Malaguzzi-Valeri, C. & Orabona, Maria, L., 567
Maldonado, J. F., Acosta-Matienzo, Josefina & Vélez-Herrera, F., 549
Mann, Ida, 546
Manson-Bahr, P. E. C., 522
Mara, L., 511
Marmion, B. P., 526 *bis*

Alphabetical List of Authors or Sources—*cont. from page 3*

Maroja, R. C., 550
Maruyama, M. & Aoyama, J., (559)
Matsumoto, K. K., Amatuzio, D. S., Lomasney, T. L., Ayres, W. W. & Cuttle, T. D., 578
Meyers, F. M., 506
Miyazaki, I., 565
Moore, D. V., 556
Mueller, J. F. & Will, J. J., 570

Nañagas, V. T., Pascual, A. A. & Caplas, M. S., (556)
Napier, L. E., 520
Navrátil, B., Smíd, Z. & Bárta, K., 583
Nederlandsch Tijdschr. v. Geneesk, 506
Neghme, A., Silva, R. & Rodríguez Z., L., 557
Nikolich, M., 531
Nishimura, S. & Kono, M., 548
Nolan, M. O. & Bond, H. W., 555
Novi Sad, 531
Nussenzveig, I., Wajchemberg, B. L., Macruz, R., Netto, A. S. F., Timoner, J. & Azul, L. G. do S., 519

Oliver, A. D. & Eden, W. G., 586
O'Reilly, M. J. J., 575
Ota, S. & Tadokoro, H., 559

Pampana, E. J., 510
Pangalos, G. E. & Mercier, P., 575
Paque, A. & Duliere, L., 581
Parker, R. T., Menon, P. G., Merideth, Ann M., Snyder, M. J. & Woodward, T. E., 524
Pimentel, D., 533, 588
Pinto, D. B. & Deslandes, N., 552
Poleff, L., 579
van Poll, F. M., (505)
Popper, H. & Schaffner, F., 569
Porterfield, J. S., 529
Portier, A., Cabannes, R. & Massonnat, J., (573)
Portnoy, J. & Edmundson, W. F., 545
Purandare, N. M. & Deoras, S. M., 538

Quan, S. F., Kartman, L. & McManus, A. G., 534

Rachelson, M. H. & Ferguson, W. R., 565
Radovanovitch, M., 580, 581
Rajindar Pal & Sharma, M. I. D., (585)
Rathmell, T. K., 553
Ray, A. P., Nair, C. P., Menon, M. K. & Misra, B. G., 515
Ray, H. N. & Sen Gupta, P. C., 536
Regonesi, C., Muranda, M. & Artigas, J., 537
van Riel, J., 591
Roback, S. S., (588)
Roberts, D. F. & Lehmann, H., 572
Rollo, I. M., 508
Romero, A., 529
—— & Trejos, A., 528

Sadeh, J., 557
Sakoda, A., 557
di Sapio, G. & Mele, E., 531
Sarmento, A., (591)
Sautet, J. & Aldighieri, R., 511
Sawada, T. & Hara, K., 541, 542
Schwetz, J., Baumann, H. & Fort, M., 550
——, Fort, M. & Baumann, H., 555
Senevet, G. & Andarelli, L., (585)
Sergent, Ed., (517)
Shammas, J. A., (557)
Sharma, M. I. D., (586)
Shoul, M. I., 559
Shute, P. G., 525
da Silva, L. H. P. & Nussenzweig, V., 518
Singh, I., 540
Singh, S. N. & Rao, V. R., 565
Slavin, G., 525
Smith, E. W. & Conley, C. L., 572
South Pacific Commission, 506, 561
Stoker, M. G. P., 526
Sutorisová-Stolzová, Margita, (524)

Takano, K., Kitaoka, M. & Shishido, A., 528
Tange, Y., (574)
van Thiel, P. H. & Metselaar, D., 510
Thorson, R. E., Bailey, W. S., Hoerlein, B. F. & Seibold, H. R., 523
Thurman, Ernestine B., (513)
Trapido, H., 512
Türkay, N., 532

Unseld, D. W., 576

Vargas, L., 588
Vaucel, M., (514)
Venkatachalam, P. S., Srikantia, S. G. & Gopalan, C., 568
Vincke, I. H., 512

Waaler, E., 546
Wagener, H. P., (577)
Wallis, R. C., 584
Walters, J. H. & Young, N. A. F., 571
Weinstein, P. P., 558
Weitz, B., 520
Weyer, F., 525
Winckel, W. E. F., 567
Woods, A. C., Jacobs, L., Wood, R. M. & Cook, M. K., 576
World Health Organization, 564

Yamaguti, S., Inatomi, S. & Kimura, M., 560
Yang, Chen-chung & Chang, Liang-tien, (574)

Zaiman, H. & Safholm, R. D., 566
——, Stoney, J. M. & Headley, N. C., 566
——, ——, Rubel, June & Headley, N. C., 566
Ziprkowski, L., Rein, C. R. & Kitchen, D. K., 582